ILLINOIS TECH ENGINEER

AND ALUMNUS

OCTOBER, 1942

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Wishnick-Tumpeer, Inc. is equipped to give you this service. Our two centrally located refineries are designed specifically for selectively blending and processing asphalts to exact customer requirements. These products are Pioneer Asphalt Specialties—known for more than forty years for high quality. Once a specification has been established, Pioneer products are controlled carefully to these standards during the refining process and are subject to rigid laboratory inspection. Through its pilot plant the laboratory can manufacture finished products in which the asphalt specialties are used. Thus tests can be made from the customer's own viewpoint, and our staff of trained technologists and engineers is in a position to make recommendations for improvements and help to eliminate undesirable factors.

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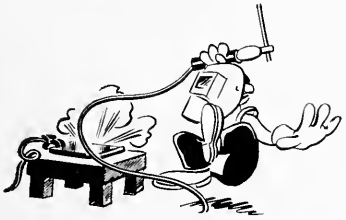
G-E Campus News

COLLECTOR

VINCENT J. SCHAEFER, of the G-E Research Laboratory, used to collect snowflakes, and because of his hobby metallurgists now have a simple method of observing details of metal structures far too fine to be seen with an ordinary microscope.

The young scientist's method of "casting" snowflakes in a film of Formvar has solved the problem of how to get a metal specimen thin enough to be examined in the electron microscope. (This device uses electrons instead of light to form the magnified images, and the electrons must pass through the specimen.)

A thin film of resin, stripped from the specimen and retaining all the details of the metal surface, can be placed in the microscope and be magnified as much as 100,000 diameters.



CALAMITY JOE

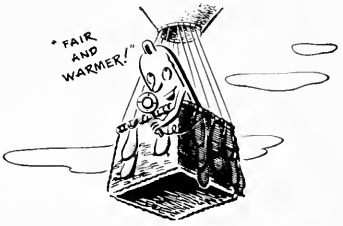
EVERYTHING happens to Joe.

And anything is likely to happen when he picks up the welder's electrode, because Joe MaGee, an animated cartoon character, doesn't know the first thing about welding. Throughout the new G-E instructional movie, "The Inside of Arc Welding," he seems to do the wrong thing.

But Joe does a good job of teaching you how *not* to strike the arc and how *not* to control the metal in the molten pool. His bungles, plus close-ups of the arcs in action, make this full-color film "one of the most helpful training aids ever offered to the welding industry."

The movie is in six parts. Each part (16 mm.) is complete in itself—a 10-minute sound production covering one particular phase of arc welding in full detail.

Organized groups may borrow the films with no charge other than transportation costs; schools and industry may buy single reels at cost—$52 each—for use in training welders. Write Campus News, General Electric, Co., Schenectady, N. Y.



SH-H-H-H-H-H!

THE one announcer in the country who can give weather forecasts over the air is a mechanical man who broadcasts from a point 12 miles up in the stratosphere, where next week's weather is in the making.

This mechanical investigator, whose heart is an electron tube, works for the U. S. Weather Bureau. He weighs only a couple of pounds and looks like a large box camera.

As a small balloon takes him up, the robot broadcasts the atmospheric conditions he finds. Tuned in with a ground receiver, the radio signals tell the temperature, wind velocity, etc. The balloon bursts at the low pressure limit (about 60,000 feet above ground), and a parachute brings the radio sonde, as it is called, down to earth.

The mechanical weatherman carries a calling card with his return address on it in case he gets lost on the way back.

GENERAL ELECTRIC

963-46-211

BLAZING THE WAY TO FASTER PRODUCTION

As EASILY as a knife cuts through pancakes, this white-hot oxy-acetylene flame zips through stacks of steel plates . . . turning out metal parts in a fraction of the time required by other methods.

Cutting as many as twenty plates at a time, this knife that never dulls . . . guided by positive templates . . . can follow the sharp twists and turns of highly complicated patterns. Oxy-acetylene stack-cutting saves shaping, machining, and assembly time. It produces parts of identical size and shape. It reduces scrap losses . . . makes possible substantial savings in subsequent machining and fitting operations.

Stack-cutting is only one of the many oxy-acetylene processes for cutting, fabricating, and treating metals which manufacturers are using to speed up production today. Whether cutting up scrap . . . or skinning steel alive by planing a light cut from the four sides of steel blooms as they speed down the roll table . . . or helping to shape and weld finished steel . . . the oxy-acetylene flame is a tireless worker in modern manufacturing.

Would you like to know how flame-cutting and other oxy-acetylene processes could be applied to your business? You are cordially invited to avail yourself of the store of knowledge Linde technicians have assembled over a long period of years.

• • •

The important developments in flame-cutting—and other processes and methods for producing, fabricating, and treating metals—which have been made by The Linde Air Products Company were greatly facilitated by collaboration with Union Carbide and Carbon Research Laboratories, Inc., and by the metallurgical experience of Electro Metallurgical Company and Haynes Stellite Company—all Units of Union Carbide and Carbon Corporation.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

GENERAL OFFICES:
New York, N.Y.

UCC

OFFICES IN
PRINCIPAL CITIES

Contributors

Ruth Cowan Clouse is professor of Nutrition and chairman of the Department of Home Economics.

Herbert W. Lange is a graduate of the University of Wisconsin, with a degree in Mechanical Engineering. He was formerly on the staff of Underwriters' Laboratories, Inc., and is now chief engineer of the fire division, Cardox Corporation.

Gordon Lund is assistant director of the Institute's news bureau.

L. R. Oaks is assistant to the director of the Armour Research Foundation.

Ralph E. Peck is assistant professor of Chemical Engineering.

S. M. Spears was formerly associate professor of Civil Engineering. He is now a captain in the United States Army, on active duty.

John J. Schommer is professor of Industrial Chemistry, director of Physical Education, and director of placement. He is also assistant to the adviser on Occupational deferments, Cook County Appeal Board District, Selective Service.

Roe L. Stevens is associate professor of Bridge and Structural Engineering.

James S. Thompson is professor of Physics, and chairman of the Department of Physics.

Laurence B. Tipton is a captain in the United States Army, on duty as war safety training supervisor for the Department of Labor. His article in this issue is condensed from a graduation address to one of the sections in safety engineering of the E.S.M.W.T.

John I. Yellott is professor of Mechanical Engineering, director of the department, and chairman of the E.S.M.W.T. committee.

The cover picture shows the electrostatic high-voltage generator—the atom-smasher—referred to in Dr. Thompson's article. Dr. W. R. Kanne, in charge of the high-voltage laboratory, is making adjustments.

ILLINOIS TECH ENGINEER AND ALUMNUS

OCTOBER 1942

VOLUME 8 NUMBER 1

IN THIS ISSUE

Published in October, December, March, and May. Subscription rate $1.50 per year. Editorial and Business Office, Armour College of Engineering of Illinois Institute of Technology, 3300 Federal Street, Chicago, Illinois.

RESEARCH IN THE DEPARTMENT OF PHYSICS

By
J. S. THOMPSON

Before 1937 a considerable amount of industrial research and testing was carried on by members of the Department of Physics, often in cooperation with one of the Engineering departments. This type of work was not prepared for publication in the standard academic journals because the results were usually restricted to some specific problem of development or manufacture, and in most cases were obtained for the private use of the sponser. A few examples of this type of investigation might be of interest. Over a period of years an eastern concern was engaged in developing insulating materials particularly for use in radio equipment. In the course of this work two members of the department cooperated in determining the dielectric properties of the materials such as power factor, dielectric constant, and resistivity, and the dependence of these properties on temperature, moisture content, and frequency. Other investigations included the spectroscopic examination of brass alloys, radioactive contents of ores, expansion of ceramic materials at high temperatures and the characteristics of organic glow discharges. Some outside work was carried on, particularly in connection with the development of radium and radon sources for medical use.

While the type of activity outlined without a doubt made contributions to industry and broadened the knowledge and experience of the men involved, it did not constitute the kind of basic research which should be one of the functions of a Department of Physics. Each problem was a specific one and presumed a considerable knowledge of physics on the part of the investigator, but these problems did not offer the proper background in fundamentals upon which the training of future physicists could be based. Of course, at this particular period in the development of the Institute practically no advanced work in Physics was offered and the entire job of the department was teaching undergraduate engineers. As a contribution to the objectives of that time this type of research had its place.

During 1936 the Armour Research Foundation was organized and the research and testing by individuals and departments in the Institute came to an end. Quoting from the bulletin of the Graduate School, "The Foundation was organized for the purpose of rendering a research and experimental engineering service to industry . . . ." This organization consolidated the resources of the Institute and made possible the pooling of men and equipment under one director. The advantages and benefits to industry have been made apparent by the rapid growth and importance of the Foundation.

One year later, in 1937, the Graduate School was formally set up under the administration of a Dean, and this events marks the beginning of a program of fundamental, basic research in the Department of Physics, a program entirely divorced from the functions of the Research Foundation. In the beginning an effort was made to split the services of a physicist, assigning part of his time to the Foundation and part of it to the Department of Physics. After a year or so it became apparent that this sort of arrangement was not satisfactory—the man's chief interest lay in one place or the other and the dilution of effort made him less effective on the whole. While there exists excellent cooperation between the Department and the Foundation in the exchange of equipment and ideas, the personnel and activities are completely independent, with independent objectives.

At the present time the research activities of the Department of Physics center around three laboratories, each organized under a director who plans the general program and is in direct charge of the work of the graduate students and other staff members working in his field.

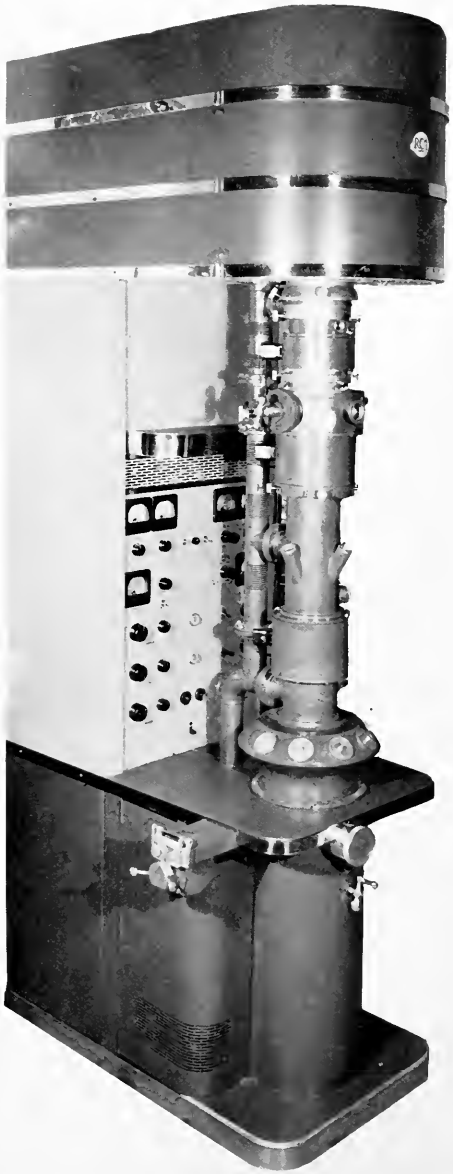
The first of these laboratories has been developed for the study of fundamental problems in Electron Physics and is under the direction of Dr. Paul L. Copeland. Associated with him in this work are J. S. Thompson, W. W. Colvert, Francis C. Breeden, W. R. Kennedy and Carroll Lufcy, the latter three men being graduate assistants. Dr. Copeland came to the Institute in 1937, having been previously on the staffs of M.I.T. and Montana State College. He carried on some research in electrolysis for the Foundation during his first year, but since 1938 has given his full time to the Department of Physics.

A relatively small amount of equipment was already available for work in electronics. This had been acquired in connection with an advanced laboratory course which had been given for a number of years. Since then the laboratory has been enlarged and much new equipment added. Research and instruction are now carried on in laboratories in the basement, second, and third floors of the Physics Building. Equipment includes four diffusion pump units and gauges for high vacuum work, a bombarder for outgassing metal electrodes in vacuum, a variety of bridges and meters, two vacuum tube voltmeters, direct current power supplies up to 75,000 volts, oscilloscopes, a large selection of standard and special vacuum and gas discharge tubes, a monochromator and a specially shielded electron tube ammeter which can measure currents of the order of 10^{-16} amperes. A small

X-ray laboratory equipped with a crystal spectrometer is available.

Perhaps the outstanding single piece of equipment for the work in electronics is the recently acquired Type B RCA Electron Microscope. This instrument is housed in its own laboratory including a dark room on the third floor of the Physics Building and at the present time is being put into operation. The microscope could well merit a long discussion but a few remarks concerning its use may be of interest here. Its operation depends upon well known principles of electron optics. Shadow images are formed by means of 60,000-volt electron beams travelling in high vacuo which impinge either on a fluorescent screen for visual observation or upon a photographic plate. The electrons are focused by means of magnetic lenses which are analogous to the glass or quartz lenses that form the images in the optical microscope. Magnifications of 50,000 diameters are common as compared to 2000 for the light microscope, and values above 100,000 have been obtained. What is more important, the resolving power of the instrument is of the order of fifty times that for an ordinary optical system which means that much greater detail in the specimen is revealed. A recently developed Electron Diffraction Camera attachment permits further detailed study of the structure of matter by electron waves. While the instrument has been perfected in recent years, and there are only about forty in use in this country, it has already made important contributions in biology, chemistry and metallurgy as well as in physics. Specifically, the laboratory plans first to use the instrument in connection with the study of thin films and to make it available to other divisions of the Institute. A research assistant has been assigned to the microscope laboratory to facilitate the use of the instrument.

Dr. Copeland's previous research has been in the field of secondary emission which is a phenomenon in which surface films play an important part. When established at the Institute he first undertook a number of studies concerning the surface properties of electrodes in vacuum tubes. More recently the work has been expanded to include problems in gaseous discharges, particularly mercury ares, in photoelectric emission, and in space charge limited currents. In these studies he has had the collaboration of a number of graduate students, some of whom elected to do thesis work; others, mainly from the evening division, were interested in securing experience in the research methods used in this field. Research under Dr.



Type B RCA Electron Microscope now being installed in the Electronics laboratory of Dr. Copeland.

Copeland to date has included the following topics: An Investigation of Dynatron Hysteresis; The Stability of Mercury Arcs; The Excitation of the Anode Effect; The Plasma of the Mercury Arc; A Study of the Alternating Current Multiplier Tube and Photoelectric Sensitivity as a Function of Feld Strength. The most important results of this work have been summarized in a series of papers presented before the American Physical Society. In addition, Dr. Copeland has published a number of papers embodying the results of his own study and research on secondary emission, the anode effect, work function, and electron optics. At present there are four graduate assistants attached to the Electronics Laboratory and work is being continued on secondary emission problems and their applications, on grid currents in thyratrons and other phases of gas discharge phenomena, on photoelectric properties of materials, on space charge limited electron currents, on electron optics, and with the electron microscope and diffraction unit.

The Spectroscopy Laboratory was established in 1939. At that time Dr. Forrest F. Cleveland joined the staff of the department and took charge of the laboratory as related to the work in physics. Closely associated with him from the beginning has been Dr. M. J. Murray of the Department of Chemistry who supervises the chemical aspects of the program. As a re-

R. H. Saunders, graduate assistant, adjusting the light source for the Raman Spectrograph which is housed in the box in the background

Dwight Hamilton, graduate assistant, adjusting the plate holder of the new Hilger High Speed Spectrograph in Dr. Cleveland's Laboratory.

sult of the cooperation and labors of these two men the work in spectroscopy here has developed rapidly and prospered. Their laboratory occupies the entire northeast section of the basement and contains two dark rooms. When these two men came to the Institute they brought with them a two-prism spectrograph designed for work in Raman spectra. The prisms were obtained through a grant from the society of the Sigma Xi. Some improvements on the spectrograph were made in our instrument shop and a research program was started without delay. In addition to the original spectrograph the principal equipment of the laboratories now includes: a Hilger Type E 518 High-Speed Spectrograph obtained from London at a cost of approximately $2000; a Gaertner Micro-densitometer, a Recording Infra-red Prism Spectrometer, and a good deal of auxiliary apparatus. Grants were made to Dr. Cleveland by the American Philosophical Society for the

densitometer and by the American Academy of Arts and Sciences to partly defray the cost of the Hilger instrument. The infra-red spectrometer was designed by Drs. Cleveland and Murray and constructed in the Instrument Shop of the Institute by Mr. Max Schoenherr who is in charge of the shop. It represents an investment of approximately $5000. The two Raman instruments are in practically continuous operation.

The work of the Spectroscopy Laboratory is concerned with the structure of molecules. The combined Raman and infra-red spectra of molecules provide a method of identifying or "finger printing" them. An application of these methods is in the analysis of unknown mixtures, particularly hydrocarbons, by the petroleum and chemical industries. Dr. Cleveland has recently been asked by the American Petroleum Institute to obtain the Raman spectra of a series of hydrocarbons provided by them. This work is done in cooperation with Pennsylvania State College and Ohio State University. E. I. DuPont de Nemours and Co., the American Cyanamid Co., and the Dow Chemical Co. are among other large companies which have installed laboratories to utilize the Raman and infra-red methods. Information that should result from this series of investigations will be of value in connection with the refining of petroleum products and will thus contribute materially to the war effort.

To facilitate the use of the Raman and infra-red data in scientific work and in industrial applications, a collection of data in these and related fields is being published in the *Annual Tables of Constants and Numerical Data* under the chairmanship of Professor H. S. Taylor of Princeton University. Dr. Cleveland is one of the collaborators in this work.

Five graduate students are now at work in the spectroscopy laboratory under the joint direction of Drs. Cleveland and Murray. These men are D. T. Hamilton and A. G. Meister of the Department of Physics, and R. H. Saunders, H. J. Taufen and R. E. Dineen of the Department of Chemistry.

Twenty papers have been presented at scientific meetings and eighteen papers have been published in Physical and Chemical journals by members of the spectroscopy group since 1939. Work in progress will be continued and plans are being formulated which will include work on the Raman spectra of gases and vapors. Recently the work of the spectroscopy laboratory to date was collected in one of a series of Research Publications of the Institute entitled *Molecular Spectra.*

A Nuclear Physics Laboratory has been in process of construction under the direction of Dr. W. R. Kanne since 1940. The major unit will be an electrostatic, high-voltage generator to be operated in a large steel tank under high pressure. This pressure vessel was delivered to the Institute in June, 1941, and was a gift of the Chicago Bridge and Iron Company and the Taylor Forge and Pipe Works. It is a flanged cylindrical tank built in two pieces, the entire assembly being about 4½ feet in diameter and 11 feet long, and is designed to operate at a pressure of about 150 pounds per square inch. The vessel is mounted with its axis horizontal and the larger section rests on small railroad wheels which roll on rails in order to facilitate opening the tank. Inside the tank is mounted the working parts of the generator itself, which is of the Van de Graff type. It consists essentially of a large aluminum electrode supported by insulating textolite tubes which are mounted as a horizontal tripod. The electrode is brought to a high voltage by the accumulation of electric charges which are conveyed from the low voltage end by a canvas belt travelling at about a mile a minute. It is hoped that a potential of between 1.5 and 2.0 million volts will be maintained in this way. By burying the electrode system within the tank in air under high pressure it is possible to attain this voltage in an apparatus of relatively small dimensions, by reduction of the spark-over distances. Enclosed also within the pressure chamber and electrically connected to the high-voltage electrode is the accelerating tube. This tube is highly evacuated by pumps mounted outside the tank and provides a path for the high-speed protons or other charged particles which are to be used as projectiles.

It is planned to use the generator for research on the properties of atomic nuclei. For this type of work a good deal of auxiliary electronic equipment for the detection and measurement of atomic and nuclear particles is needed. Much of this apparatus has been constructed along with the building of the generator. M. H. Wilkening has recently completed some research under Dr. Kanne's direction on the Geiger counter, one of the most useful of these tools of the nuclear physics and radioactivity laboratories.

The generator is practically completed but will require several months of testing and adjustment. Unfortunately, work has been suspended temporarily due to the absence of Dr. Kanne who is on leave of absence during the war emergency. We are planning to resume this work at the earliest opportunity. In the interim, Dr. R. Samuel will occupy the High Voltage Laboratory and expects to carry on research on some problems in chemical physics.

These research laboratories constitute the backbone of the whole graduate program in physics. The graduate courses, for the most part, are given by members of the staff who are actively engaged in research on the subject matter presented, and graduate students have all the opportunities to be found in vigorous and growing laboratories.

The research activities of the department have been curtailed to a certain extent because of the demands for physicists in connection with the war effort. In addition to Dr. Kanne, Dr. Christy and several graduate assistants have left the Institute for war research. We feel that because of this very demand for men trained in physics we should make every effort to maintain our graduate program which will help fill the urgent need. There is a feeling among some physicists that graduate work should be suspended for the duration, but sometimes it is this very group who find themselves in urgent need of men with just this training. The situation is something of a vicious circle and no one knows what job is most important. However, the department has been able to cooperate with other laboratories engaged in war research in providing them with men and some equipment and still is able to offer an adequate graduate program. The National Selective Service director, the War Policy Committee of the American Institute of Physics, and other authorities inform us that we must continue to produce technically trained men on all levels. To do this job we must maintain a substantial program of graduate instruction and research.

PUBLICATIONS FROM ELECTRONICS LABORATORY
1939-42

Secondary Emission of Electrons from Sodium Films Contaminated by Gas, Paul L. Copeland; Phys. Rev. 55, 1270 (1939).

Anode Effect as a Function of Temperature, Paul L. Copeland; Phys. Rev. 57, 625 (1940).

Secondary Emission from Films of Platinum on Aluminum, Paul L. Copeland; Phys. Rev. 58, 604 (1940).

An Experiment for the Determination of Work Function Through Calorimetric Measurements, Paul L. Copeland; Am. Journ. of Physics, 9, 21 (1941).

Excitation of the Anode Effect, Paul L. Copeland and Gerald G. Carne; Phys. Rev. 61, 635 (1942).

PUBLICATIONS FROM SPECTROSCOPY LABORATORY
1939-42

1. *Raman Spectra of Acetylenes. II. Displacements and Depolarization Factors of Phenylacetylene and Derivatives of the Type C.H.C≡CR*, M. J. Murray, F. F. Cleveland; Journal of the American Chemical Society, 61, 3546-3549 (1939).

2. *Raman Spectra of Simple Ethers*, F. F. Cleveland, M. J. Murray, Herschel H. Haney

(Turn to page 40)

EXTINGUISHING FIRE WITH LOW PRESSURE CARBON DIOXIDE

By
H. W. LANGE

Common forms of carbon dioxide are familiar to many, as are most of its characteristics. It appears in air to the extent of one-half of one percent; it constitutes approximately four percent of the breath exhaled by human beings. In its pure form it can be liquefied by compression at temperatures below 88° F., its critical point. It has no liquid phase at atmospheric pressure, and this property makes inerting characteristics of carbon dioxide especially valuable in fire extinguishing. Carbon dioxide has other interesting fields of use, but this article will deal with its most rapidly developing application,—that is, for fire extinguishing purposes. As a preliminary, it is desirable to discuss briefly the thermal properties of the material.

Above 88° F., carbon dioxide is a vapor, regardless of the pressure exerted upon it. Below 88° F., the vapor can be liquefied by compression and held in liquid form by maintaining the pressure. In a properly filled commercial cylinder, the pressure necessary to maintain a liquid phase is of the order of 850 lbs. per square inch at 70° F. With no control of temperature, the pressure in such a cylinder rises rapidly with temperature increase: it is approximately 1465 lbs. per square inch at 100° F., and 2000 lbs. per square inch at 120° F. Conversely, temperature reduction causes pressure reduction, and at 0° F. the pressure of equilibrium is 290 lbs. per square inch. At 110° F. below zero the gage pressure is nil and the carbon dioxide is in its solid form. Having no liquid phase at atmospheric pressure, carbon dioxide must be in solid or gaseous form. The change from solid to gaseous forms under such conditions occurs by volatilization without passing through the liquid phase. When released from the liquid form within a container to the atmosphere, it appears partially as solid in the form of snow and partially as vapor. The percentage of slowly volatilizing snow thus formed depends upon the temperature of the carbon dioxide before it was released. From 0° F. initial temperature, 45 percent of the discharge is available as snow, and from 85° F. initial temperature, 21 percent snow may be formed.

The percentage of snow formed during discharge, as for fire extinguishing purposes, determines potential cooling capacity available. The discharge from 0° F. has cooling capacity to 100° F. of approximately 150 BTU per lb., as compared to 50 BTU per pound available from discharge occurring with 85° F. initial temperature. Since for all practical purposes in extinguishment, cooling by radiation or by direct contact of the cooling extinguishing agent is essential for positiveness of control, a difference of the order described becomes of major importance. Water is often referred to as having great cooling effect (potential 1000 BTU per pound if raised past its steam point). By actual comparison at the temperatures discussed, it is found that a pound of tap water at 60° F. has but 40 BTU cooling capacity when raised to 100° F. Furthermore, it is doubtful if a fraction of one percent of the water applied for fire extinguishing purposes is raised in temperature to any such extent. The foregoing discussion does not relate to the smothering action, which is the primary means by which carbon dioxide extinguishes fire.

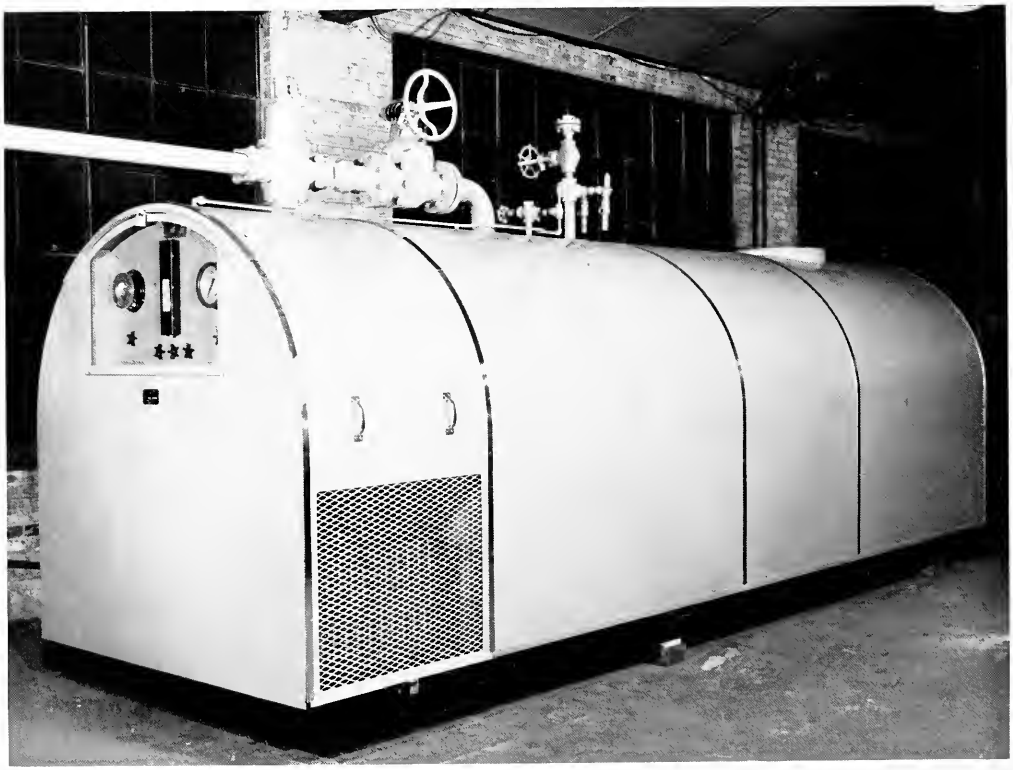
While relatively new as a fire extinguishing medium, carbon dioxide has been used in bottled form for fire extinguishing equipment for the past fifteen years with remarkable success whenever called upon. Constant low temperature (0° F.) CO_2 has extinguishing ability over and above the ordinary bottled form. The addition is actually attributable to a subtraction; i. e., the subtraction of heat to provide the enhanced qualities mentioned above for 0° F. carbon dioxide.

Carbon dioxide controlled at 0° F., and the corresponding 300 lbs. per square inch pressure, is termed low pressure carbon dioxide and it, as well as the extinguishing equipment employing it, is marketed under the trademark "Cardox." To maintain the standard condition of 0° F., Cardox CO_2 is refrigerated by a unit built into the liquid supply container of low pressure fire extinguishing systems. Maintenance of standard low temperature of liquid CO_2 to give this medium some of its fire extinguishing properties is done efficiently by storing the liquid in single containers which are independent of ordinary size limitations. Capacities of these units now in use for fire extinguishing storage range from 500 pounds to 40 tons. Storage tanks for other purposes have capacities as high as 125 tons. Insulation of these supply units is provided to make possible shorter and less frequent operating periods for the mechanical refrigerating device.

While the insulation reduces the rate of heat input to such an extent that the average period of power interruption and subsequent lack of refrigerator operation would not cause a dangerous rise in the temperature

and pressure in the containers, the eventuality of power outage over a long period is provided for by the incorporation of pressure releases. When these pressure releases operate, an alarm provided for the purpose indicates the need of attention.

Early development of equipment for the use of carbon dioxide as an extinguishing agent passed through stages involving use of portable equipment wherein CO_2 gas and snow discharge served as first aid. In system installations batteries of 50-lb. cylinders were employed to serve enclosed spaces of moderate size and extinguish fires by reducing the oxygen concentration below the point where fires in common materials could continue. The first Cardox CO_2 low pressure systems installed followed the common general principles of the prior cylinder systems with extensions mainly in size of hazards, in reserve capacity for a second shot to eliminate the necessity for production shut down, and in the provision of a more generous primary treatment. A few of these installations with modifications in numbers and size of hazards quickly developed lines of progress in several directions, including protection for fairly large hazards in



Storage Unit. Refrigerated Cardox storage units are available in capacities of from 750 lbs. to 125 tons. These units may be conveniently located in a plant, or out-of-doors, and a single storage unit may provide protection for many fire hazards.

Above: Transformer tank 5 feet in diameter by 10 feet high surrounded by diked-in areas 20'x20' charged with 100 gallons of transil oil, overflowing at the rate of 20 gallons per minute. Oil was ignited and allowed to burn for 5 minutes.

Below: CO_2 is released into the fire zone and is shown here enveloping and clinging to the fire area. This is a significant factor, considering the presence of a 15 m.p.h. natural wind and a 45 m.p.h. artificial wind.

the open, such as, for example, large outdoor transformers.

By experimentation through actual test it has been possible to provide systems giving protection to outside transformers despite extreme conditions of wind. Air velocities up to 45 M.P.H. were created under test conditions and extinguishment attained under unusually severe conditions of burning, before actual installations were made. The operation involved in this development calls first for application of an ample mass discharge of CO_2 to the fire zone so that expansion (500 to 1 with 0° CO_2) occurs in all direction to inert the fire zone. Second, the tremendous cooling capacity of 0° CO_2 plays a most important part in this type of protection, inasmuch as great quantities of steel and flammable liquid must be cooled to a point where re-ignition will not occur. Actually, five tons of this 0° CO_2 possesses 1,500,000 BTU potential cooling capacity when raised to 100° F. and released to atmospheric pressure, and while it is appreciated that all of it is not usable for cooling steel in such application, potentially 25,000 lbs. of steel could be cooled more than 200° F.

The number of low pressure CO_2 systems for the protection of transformers, indoors and outdoors, is increasing rapidly. The provision of these CO_2 systems in power plants also has brought indoor power-plant hazards to attention, and, as a result, it has been found that large numbers of such indoor hazards as switchboard rooms, switch-gear rooms, generators, indoor transformers, oil lines, and the like could all be treated by the same source of supply.

Such treatment of a multiplicity of hazards from an adequate central supply by means of measured flow and timed discharge has opened other remarkable fields of activity. Among these are those of the airplane engine test cell buildings and associated hazards in airplane-engine manufacture. Practically all new airplane-engine plants have built-in low-pressure carbon-dioxide extinguishing systems for the protection of engine test-cells and related hazards. Hundreds upon hundreds of test cells, control rooms, and the like are at present involved in this coverage, and the total to be so protected through present construction schedules runs over 1,000 in number.

Test cells vary in design, but a representative one can be taken as a room 20′ x 20′ by 60′ long with a 20′ x 20′ stack (air intake and exhaust) at each end. Representative protection by low-pressure systems involves a source of supply ample for a score or more of fires; automatic control supplemented

Complete extinguishment has occurred after a discharge of 1 minute. All flaming appeared to have stopped after the first 15 seconds of discharge; the additional 45 seconds cooled down hot metal surfaces, preventing a reflash. Notice CO_2 snow in diked-in area.

by push button at the test-cell control-room desk; pre-discharge, timed alarm; electric shut-down of engine, fans, solenoid gasoline and oil valves; shut down of engine by positive injection of CO_2 into the carburetor intake; and timed discharge of CO_2. The listing of this sequence of events takes longer than the actual accomplishment. While records of fire performance are not available for publication, it is proper to record that dozens of extinguishments have been accomplished with no failures or cases where the engine has been lost. This despite the fact that it is commonly recognized that an engine fire persisting for as long as ½ to 1 minute is likely to result in total loss. With the requirement that engine test cells operate 24 hours per day, the importance of quick extinguishment, no damage by extinguishing agent, and immediate resumption of production with ample reserve extinguishing capacity is emphasized. These features were quickly recognized by other industries. As a result, low pressure systems are now protecting and being installed to protect the following hazards:

- Air Flow Test Boxes
- Breakers and Transformers
- Carburetor Test Rooms
- Conveyors
- Dip Tanks
- Drying Ovens
- Dynamometer Rooms
- Oil Quench Tanks
- Oil Reservoirs, Steam Turbine
- Oil Storage
- Paint and Lacquer Storage
- Paint Shops
- Pipe Tunnels, Electric & Oil
- Record Vaults
- Roof Tanks
- Rotary
- Electrical Bus Bays
- Engine Test Cells
- Filling Rooms
- Gas Line Tanks
- Gas Pump Rooms
- Generator Lead Tunnels
- Generator Rooms
- Lacquering Operations
- Converters
- Rubber Processing Rooms
- Solvent Stills
- Solvent Storage
- Spray Booths
- Storage Rooms
- Strip Mills, Hot & Cold
- Transformers, Indoor & Outdoor
- Vat Storage

A basic storage unit has been put on wheels, and discharge equipment has been devised and added to produce an airport fire truck with phenomenal extinguishing ability. Airport fire trucks of this kind are in service and have been demonstrated to be capable of extinguishing almost instantly fires that are of size and type for beyond those previously considered controllable. The airport fire truck shown in the accompanying photograph is mounted on a three-axle, all-wheel drive, heavy duty chassis.

The extinguishing agent employed consists of three tons of low pressure carbon dioxide and 300 gallons of water. There are two hose lines attached to the water tank, each terminating in a special type of nozzle. A Cardox hose-reel, carrying 1½″ hose, is mounted centrally on each side of the truck. These reels are so arranged that carbon dioxide may be supplied from both sides under manual control.

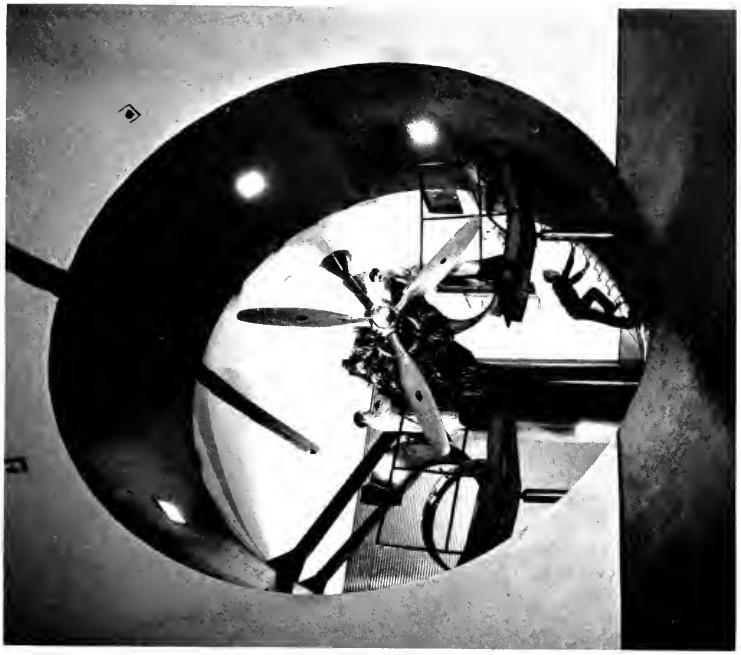
Each nozzle is capable of discharging carbon dioxide at a rate of 700 pounds per minute, with effective extinguishing range of approximately 25 feet. Such a nozzle has been demonstrated to be capable of extinguishing flammable liquid fires in a pool having an area of 20′ x 30′.

The large cab-control nozzles supplement this manual form of protection and provide the main extinguishing application. The boom nozzle is mounted over the cab and has a discharge capacity of well over 2000 pounds of CO_2 per minute. It has an effective extinguishing range of more than 50 feet, and the 15-foot boom mounted on top of the truck makes it possible to attack fires from above. The boom itself, which normally rests over the body of the truck, is moved about by means of a joy-stick control mounted in the cab. It may be elevated or lowered and moved from one side to another. The nozzle itself is also controllable by the same joy stick and can be moved forwards and backwards. Discharge is accomplished by pressing a trigger on the joy stick, and discharge is stopped by releasing the trigger.

The front nozzle mounted immediately in front of the radiator is similarly a high-capacity nozzle and is controllable by another joy stick within the cab. The extinguishing action of the carbon dioxide is supplemented for both the front nozzle and the boom nozzle by introducing water into the carbon dioxide discharge. This action serves to augment the cooling effect of the carbon dioxide snow in that the water forms a slush-and-ice film to cover hot metal surfaces and flammable liquid surfaces and chill such surfaces to a very low temperature. Gasoline chilled to well below zero does not reflash quickly, as it does when it is at room temperature and higher. This action of

Right: Airplane Engine Test Cell — Automatic systems provided with stand-by controls for manual operation release a mass discharge of CO_2 into the fire zone.

The presence of high-test aviation gasoline demands quick, positive, non-damaging extinguishment for airplane engine test cells.



Hedrich-Blessing Studio

Below: Cardox Airport Fire Truck — High capacity nozzles mounted on the end of the boom and at the front of the truck are controlled from inside the cab. The mass discharge from these nozzles makes it possible for an operator to "knock down" the flame immediately.

knocking down the fire and holding it in check provides great effectiveness in final extinguishment and makes it possible to extinguish an extremely large fire in a matter of one minute.

The front ground-sweep nozzle serves to control a large flat area immediately in front of the truck and to prevent the fire getting under the truck. This nozzle is also controlled in the cab by means of a separate trip valve.

As in the case of installed Cardox systems, the 3-ton CO_2 supply is maintained at 0° F. temperature and correspondingly low pressure by means of a refrigerator. Under normal conditions, the refrigerator is attached to a convenient electrical outlet. When the truck is called to a fire, the electric power disconnection is automatically made. Under normal conditions, the refrigerator is of such capacity that the transfer of heat, with the insulation provided, calls for refrigerated operation about 30 percent of the time. However, it is possible for the refrigerator to be disconnected for many hours before any loss of CO_2 through the bleeder-type safety relief valve begins.

During the relatively short time which has passed in the application and use of low pressure carbon dioxide for extinguishing purposes, there have been many developments of unique applicability for this type of protection. On the other hand, the limitations of use have been relatively few in number and the prospect as indicated is very wide. Development of equipment to meet specific conditions has already resulted in coverage far beyond early expectations, and each new application serves as an indication or suggestion of additional possible extensions.

THE SCHOOLMASTER

One of my boys has visited me. It is comforting to know that they like to come back. This one was in uniform. He is not conceited, but he could not fail to know how well he looked, in fine cloth, white navy cap, gold stripe and star on his sleeve, and, most important of all, the wings of his flying service on his breast. He flies a bomber. He teaches other fine boys to fly bombers. Our defense is strong, and it depends upon our boys,—our strong, clean youngsters.

I wrote that paragraph last year. It was printed in the December ENGINEER. The boy was Warren Umbright. He died in line of duty, September 11, 1942.

Last May, the news of the Class of '38, in the record of our alumni around the world, had the story of the death in the Philippines of John O'Connell, officer in the Army Air Force.

We grieve for our boys, and we think of the loss that has come to those who were even closer to them than we could be. More even than this sorrow and this sympathy, we older men tell ourselves that we, in our more prosaic duties, can not and must not fail to support and to be worthy of the young flower of our nation.

Has your family a Men's Club? Rather an amusing, and sometimes useful, institution if your household has a feminine majority. The club in my family was organized when my two sons were many years short of being men in the eyes of the law. It was not so much for organized resistance to womanly wiles, maternal management, and sisterly supervision, as it was an instinctive manifestation that our masculinity was a bond which the other members of the family could not really understand. Our motto was, "We men stick together." In the inevitable course of things, sons-in-law came. The charter members of the club looked them over and decided that they were eligible for membership. So ordered. Now with the club membership rather widely dispersed, it still is possible to have occasional luncheon meetings. These meetings are never at the family home. The atmosphere of the University Club is more conducive to the definitely male traditions which we smile at, but which are very real to us.

The Institute has men's clubs,—fraternities, professional societies, honor societies, athletic groups, organizations whose cementing principles are of many kinds. Some of them have developed from student initiative. Others have been founded by older men. All of these have more or less close relation with alumni, faculty, major organizations outside the school, or in some way recognize close relation to older and wiser sponsorship. In my own Men's Club I considered myself to be the Nestor, the older and wiser guide.

It has taken me many years to come to an understanding that guidance for the younger members is not the all-important objective. Of course it is one objective. But our young men give at least as much as they receive. Our older men must consider themselves fortunate when they are received by their sons of the blood and their sons of the spirit, not as disciplinarians, not as schoolmasters in any narrow sense, but as men and brethren. We have many men's clubs in our crowded, energetic, virile school. Let's have one more, whose membership will include all of our thousands.

Is this forgetful of, or worse, discourteous, to our women students and women faculty members? Of course not. Certainly my own family Men's Club involves not forgetfulness of and no discourtesy to women. But that, men, is another story.

THE ENGINEER STAFF

For the new school year, the ENGINEER announces the appointment of Howard A. Carter as an associate editor for the alumni section of the magazine. Mr. Carter graduated from Lewis in 1922, with the degree of B.S. in Mechanical Engineering. He had several years' experience as an instructor at the University of Georgia and at Lewis. He is now a member of the staff of the American Medical Association, in the section of Physical Therapy. Mr. Carter is a past president of the Lewis alumni association; he has been active in the work of organizing the I. I. T. Alumni Association, and in the conduct of the Alumni Fund campaign in Chicago suburbs.

Arthur H. Jens, Armour '31, continues his valuable service to the ENGINEER as an associate editor for the alumni section. He will be relieved of much of his detailed work in preparing classified information about alumni by Arthur E. Wright, who is executive secretary of the alumni association.

Professor Finnegan, Doctor Meech, and Mrs. Higgins continue their assignments as editor, associate editor, and business manager, respectively.

As in previous years, we have important service from student members of the editorial and business staffs.

TAYLOR AT COLGATE

Bernard P. Taylor, assistant to President H. T. Heald, represented the Institute September 24th at Hamilton, New York, when Everett Case, former assistant dean of the Harvard University Graduate School of Business Administration, was inaugurated as Colgate University's ninth president.

One hundred and twenty-one institutions from thirty-one states, three Canadian provinces and the District of Columbia were represented at the ceremonies. Dr. Harold W. Dobbs, president of Princeton University, and Dr. James B. Conant, president of Harvard University, were the principal speakers.

PROFESSIONAL OPPORTUNITIES FOR HOME ECONOMISTS TRAINED IN A TECHNOLOGICAL INSTITUTION

By
RUTH COWAN CLOUSE

Students in Quantity Cookery Classes get experience in serving food under commercial conditions.

INTRODUCTION

The term "Home Economics" has been defined by specialists in the field as the "Science of Right Living". For those who may feel that this definition is overly ambitious and that a subject so defined may be far removed from technology, it may be explained that the adoption in 1898 of the term "Home Economics" as the name for this newly defined field of knowledge was prompted by the fundamental significance of the words, *home* meaning the place for the shelter and nurture of children and for the development of self-sacrificing qualities and the strength to meet the world, and *economics* meaning the management of the home economically as to time and energy as well as to money. That this definition covers a large portion of the field of "right living" is self-evident. That knowledge in this field takes on added importance in a war economy also should be self-evident.

The importance of technological development to the economic management of the home will undoubtedly be

Large quantity food preparation in the Lewis Cafeteria

immediately apparent to graduates of a technological institution such as the Illinois Institute of Technology. Yet some alumni may not be familiar with the fact that the so-called Home Economics Movement really originated in a sister institution, namely, the Massachusetts Institute of Technology. Mrs. Ellen H. Richards, the founder of the American Home Economics Association, and an enthusiastic leader in the movement to apply scientific principles to the management of the home, was a pioneer in other fields as well. The first woman to be admitted as a student to the Massachusetts Institute of Technology, Mrs. Richards was also the first woman to be employed as a full-time instructor on its faculty. Trained originally in pure chemistry, Mrs. Richards became one of the foremost sanitary chemists in the United States and was responsible for some of the most fundamental work in sanitary analysis of water, air, and sewage to be done in the early days of this science. Mrs. Richards was deeply interested in helping to enlarge educational and scientific opportunities for women, as well as in the application of scientific knowledge to the problems of the home, and it was from the inspiration of her teachings that many present-day leaders in the Home Economics Movement have come. This was apparent at the testimonial dinner on the one-hundredth anniversary of Mrs. Richards' birth, held in Boston in June, 1942, at which prominent Home Economists such as Dr. Grace MacLeod, Professor of Nutrition at Teachers College, Columbia University and Dr. Katherine Blunt, now President of Connecticut College, New London, Connecticut, paid tribute to Mrs. Richards' early influence on their professional careers.

PROFESSIONAL OPPORTUNITIES IN HOME ECONOMICS

Teaching

Professional opportunities in Home Economics are of necessity related to the activities of the home and may cover any or all phases of the science or art of home making. Since the activities related to the home are many and varied, the opportunities open to Home Economics trained women today may be almost as varied as the interests and talents of the women engaged in them. The occupation which employs the largest number of Home Economists is of course the traditional one of teaching, which includes positions in elementary and secondary schools as well as in colleges and universities. Adult education in Home Economics has long been a part of the program of the Home Economics Extension Service of the

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TRAINING FOR DEFENSE BECOMES TRAINING FOR WAR

A Progress Report from the War Training Committee

During the next twelve months, the principal factor in industrial personnel probems will be the Selective Service system. From the original assumption that America would produce the weapons while the English, the Russians, and the Chinese did the fighting, we have reluctantly come to the conclusion that our men must also fight if our liberty is to be preserved. Estimates of the ultimate size of our armed forces are constantly being revised, but the following facts should form a reasonably accurate basis for future plans. The manpower of the nation, in the fighting age of eighteen to forty-five, is approximately twenty-eight million men, of whom some eighteen million could meet the minimum physical requirements of the armed services. The Army expects to need, by the middle of 1943, from eight to ten million men. The goal of the American Air Force is two mil-

War training for women. Industrial drafting.

ion men, while the Navy expects to need one and one-half million. Thus, the total requirements of the armed services are between ten and thirteen million, or approximately two out of each three who are able-bodied and of fighting age.

Approximately nine million able-bodied men of fighting age are either single, or with secondary dependents, or married and without children. In most cases, these men will be called first, but simple arithmetic indicates that there are not enough of such men to satisfy the ever-increasing demands of the Army alone. In the group of men of the fighting age who are married and maintain a bona fide home with their children, there are some eight million who are physically fit. It is inevitable that a large number of men will be taken from this group in 1943 and 1944. At present, the order of precedence is dependent upon the Draft Boards alone, but it is probable that legislation will result in some clarification of the status of married men.

From the figures given above, it is evident that industry is faced with the loss of most of its young men, and accordingly plans must be laid to replace these men with older men, with those who are not physically able to fight, and in many cases with women.

The present policies of the War Training Committee of the Institute are being set in accordance with the facts given above. Every effort will be made to assist industry in the retraining and upgrading of its experienced personnel, by means of part-time evening courses in specialized subjects. In addition, as far as its facilities will allow, the Institute will train women and draft-deferred men in full-time pre-employment courses which will give enough training to bring unskilled individuals to a useful level of achievement.

This policy has been developing during the past year, and alumni of the Institute will doubtless be interested in the details of some of the programs which have been developed. The War Training Committee has endeavored to foresee the needs of industry and government service wherever possible, and to make preparations to fill a need when it arises. Early this year, it became evident that women would be employed by the million in industry, in all capacities for which they are physically qualified. After making a survey of typical industries, it was concluded that a useful service would be rendered by the training of carefully selected women in chemistry, drafting, and precision inspection. It was decided that the courses in this field should operate for forty hours each week, for a period of ten to twelve weeks. By requiring the students to undergo a stiff training program, with a minimum of forty hours of work per week, it was felt that enough information could be imparted to make useful technicians, and likewise that the shock of entering industry and working a full week could be borne more easily if the women had been acclimated during their training course.

On March 9th, classes were started in Chemistry, under Dr. Supple; in Drafting, under Professor Seegrist; and in Precision Inspection, under Professor Kozacka. These courses were all given on the Lewis Campus, because the facilities there were adequate for the purpose. In each of these courses, some of the work was given by members of the regular Institute staff, but most of the instructional load was carried by full-time instructors on the war training staff.

The training of women was undertaken on an experimental basis, because the War Training Committee did not know whether an effective job could be done in such a short time, nor was it certain that industry would welcome the graduates of these brief courses. All doubts have been dispelled, however, because the women have demonstrated that they could learn, in many cases more rapidly than men with similar academic background, and the response of industry has been extremely encouraging.

In order to administer the program of War Training for Women, a separate organization was set up on the Lewis Campus, with Mrs. William C. Knopf as Registrar, Mr. Clark Woodward as Principal Interviewer, and Miss Kathryn Judkins as General Consultant and Placement Director. Mr. L. J. Lease, the Director of the Co-operative Program, also gave valuable advice. Miss Cornelia Howe was also added to the staff and she has taken over from Miss Judkins the responsibility of placement. The proof of any training course is the ability of its graduates to do the business for which they have been trained, and,

Carol Peterson, radio dramatics student and former stenographer, uses a micrometer to measure a segment of an airplane engine. She is one of forty-one women who graduated from one war-training course in ordnance inspection.

As a result of the Safety Training Program, Joseph Stennett, Industrial Safety Engineer of the National Safety Council, points out a hazard in the Lewis machine shop. The Institute is now a member of the National Safety Council.

according to this criterion, the job of training women has been well done, because more than ninety-five per cent of the graduates have been placed, and the demands of industry for these women now far exceed the supply.

In the future, it appears that about four hundred women will be kept in training continuously under the Junior Inspector Training Program, in which women who are high school graduates, with training in mathematics and physics or chemistry, may receive Civil Service appointments and be paid at the rate of $1,440 per year during their nine weeks' training period. After completing the course, and undergoing a satisfactory period of probation, these women will be upgraded to Junior Inspectors. Several hundred women have already been trained in this program and a large number have achieved positions as resident inspectors in ordnance plants.

The work in drafting will be continued and extended, if possible, since an increasing number of industries are realizing that much of their drafting work can be done by women, thus releasing men for more intricate technical jobs or for the armed services.

Training in chemistry will also continue, because the women who receive their training in this program are entirely qualified for most routine laboratory jobs, and they can release highly trained chemists for more important work.

It is highly probable that other courses for women will be added in the future. Courses now under consideration include Metallography and X-Ray Techniques, since a considerable demand for these courses exists. The principal difficulty which has confronted the Institute, as well as other colleges which have undertaken this type of work, is to find qualified women. The tremendous demand for women in industry is just beginning to make itself felt, and there are not enough women with technical training to satisfy even a small fraction of the demand.

The accompanying photographs show some of the women War Training students in action. The Engineering Building at Lewis is filled with them from eight in the morning until ten at night. Thus far, women have not been included in large numbers in the classes on the Armour Campus, but even this may occur in the future.

Late in the spring of 1942, a large number of intelligent men in the selling field found themselves without

jobs because of priorities, shut-downs, and similar matters beyond their control. These men will find their way into war industry eventually, but, with proper training, many of them will make valuable supervisors, expediters, and production planners. With this thought in mind, the War Training Committee planned and carried out a ten-weeks course in Fundamentals of Industrial Engineering. A similar course was put on at the same time by Northwestern Technological Institute, and each school has trained approximately one hundred men in this program. The course at the Institute was, again, experimental in nature, but the interest, enthusiasm, and persistence of the students indicates that the experiment was a success. The course of study included production processes, in which both the theory and the actual use of machine tools were studied, blueprint reading, practical mathematics, production planning, industrial accounting, and supervisory techniques. The course was given in the afternoon and evening, with no classes on Saturday, so that those men who still had some of their old accounts, or who had part-time employment, could continue these activities and still attend classes. Of the 102 men who started this course on July 6th, 93 received certificates at the graduation exercises on Friday evening, September 11th. Approximately one-half of them had secured jobs before the course ended, and, with assistance from the Placement Office, the rest will soon be placed. Their jobs include expediting, time and motion study, production planning, and even instruction in service training schools. Because of the excellent response which greeted this first course, it will be repeated, beginning on October 12th. In order to avoid conflicts with the regular program of the Institute, the students in the second course will attend classes all day Saturday and Sunday.

The story of the Radio Training Program is told elsewhere in this issue of the ENGINEER. The Institute has undertaken with highly creditable results the training, on a very large scale, of radio technicians of all degrees of skill. The success of the program is due to the untiring and highly intelligent efforts of Dr. Hobson and his staff. Particular mention should be made of the work of Professors D. P. Moreton, Paul G. Andres, William Edson, Robert Sarbacher, and L. T. Anderson.

The part-time evening courses, which were first undertaken in January, 1941, have continued with excellent success. Three large evening programs were given during the past academic year. In the fall program, 3356 individuals were enrolled in 125 sections of 39 different courses. The winter program, running from February to June, was the largest, with 4287 students enrolled in 144 sections of 43 courses. A large summer program was given, running from July to September, and 2500 students were enrolled in 73 sections of 25 courses. The courses which are offered in these programs are such as are not available in regular evening classes, and for which there is special need. Courses in Tool Design, Production, Industrial Supervision, and Inspection Methods appear to be in greatest demand. For example, during the summer program, 585 individuals were enrolled in 19 sections of Inspection Methods, the demand being so great that six of the sections had their laboratory work on Sunday.

It appears that the evening in-service courses will continue, and indeed plans are now being laid to run this program through 1943-44. The purpose of the evening courses is primarily to upgrade men and women who have some previous knowledge or experience in technical fields. Few of the courses can prepare an entirely inexperienced individual for new employment. The Inspection Methods course is perhaps the only one of the evening courses which fulfills this rigid requirement. The other courses, however, will be of increasing importance in the future, as it becomes necessary to replace young technicians who are called to war. New industries each week call the War Training Division of the Institute to see how their experienced personnel can be spread over an increasingly wide variety of jobs.

Two of the evening courses have been of exceptional interest,—namely, Industrial Safety Engineering and Industrial Management for Foremen. The Safety Program was organized in the fall of 1941 in response to a request from the National Committee for the Conservation of Manpower in War Industry. The Institute was asked to organize a program in which more than 1000 individuals could be trained in the fundamentals of accident prevention. This course was part of a nation-wide drive to reduce the terrible toll of deaths and injuries in industrial accidents. In order to administer a program of this size, the War Training Committee called upon the Greater Chicago Safety Council and the Chicago Board of Education for their assistance, and a full measure of co-operation was received from each. A large number of experienced safety engineers were enrolled in an Instructors' Training Program, conducted by John Roche and Joseph Stennett of the National Safety Council and Dr. John Hazlehurst. The instructors who survived this rather rigid training program were assigned to classes as students were recruited.

The War Training Committee learned a great deal about the organizing of Safety Training classes, and instead of having two applicants for each available place, as is usual in other cases, we had at least two places for each student in the Safety program. After a great deal of organizing work, more than 1000 students were enrolled in the program, and 748 of these completed the program and were graduated with due ceremony. The Safety graduation ceremonies were among the most unusual which the Institute has ever witnessed. The first of these occurred at the Sherman Hotel, as a part of the Mid-West Safety Congress. The number of graduates was so large that the certificates were awarded in batches to the instructors who later distributed them to the students. The second graduation was held in the Auditorium of the Institute, and was addressed by Captain Laurence V. Tipton, U. S. Army, assigned to the Division of Labor Standards. Captain Tipton's address was entitled "Unintentional Sabotage," and this theme has been used in the promotion of the Safety courses which are now being organized for operation during the coming fall.

A large number of classes in Industrial Management for Foremen have been organized and operated in plants of prominent Chicago industries. This program was originated under the direction of R. B. Starr, formerly of the International Harvester Company and now of the U. S. Army. He was succeeded in charge of Foreman Training by E. W. Sheehan, of the Illinois Bell Telephone Company. More than 2000 industrial supervisors, both men and women, have already been trained in this program, and it is expected that a large increase in this type of training will occur in the coming months. This course is given by the conference process, and the members of each class are taught through the experiences of their fellow students. Confidence and leadership are developed, and it is our belief that this course will contribute in a very substantial manner to improving production and morale in the plants where it is given.

As a result of the evening Safety Training Program, the Institute was asked during the summer to establish a training course for the new Explosives Safety Branch of the Office of the Chief of Ordnance, which has its

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WAR TRAINING IN RADIO

By
GORDON LUND

Like Rudyard Kipling's Fuzzy Wuzzy, the American doughboy has proved himself to be a "first-class fightin' man"—but modern warfare demands more than that. Uncle Sam also needs thousands of trained experts and engineers in the newest phases of radio communication and detection to keep all parts of his diversified and scattered armed forces in constant contact. Illinois Institute of Technology, with a Signal Corps training program which will train "thousands of men" annually, is one of the vital cogs in the machinery that is producing those radio engineers. Already, students numbered in the thousands are at work in various phases of the program. Signal Corps officers and Illinois Tech administrators estimate that the annual turnover of students will be figured in five digits, now that the program is beginning to reach full tempo.

Crux of the entire program is training in a science that existed only in laboratories before Pearl Harbor,—in micro-wave or ultra-high-frequency techniques. A subject familiar only to a few experts before December 7, it is now a regular course of instruction at Illinois Tech.

As the basis for the armed forces' newest secret device—the "electric eye" detector recently announced by Secretary of War Henry L. Stimson—as well as for the latest and most efficient communication systems, the ultra-high-frequency waves have suddenly assumed new importance to the American war effort.

The micro-wave study, important as it is, however, is far from the only radio work being carried on as a wartime activity at Illinois Tech. The training program includes every phase of work from the most elementary fundamentals to the highest-grade graduate work available in the Midwest. All the courses except those which are part-time evening courses, offered under the Engineering, Science and Management War Training program, are administered by the Institute in conjunction with the U. S. Signal Corps, and the students are men assigned to the courses by the Signal Corps.

Although numerically not the largest phase of the program, the work in micro-waves is the focal point of the entire training schedule, for it is the most advanced Signal Corps study offered in the Sixth Service Command. Moreover, it is the goal of every man in any phase of the program to complete the micro-waves work—for at the end of that long and not-too-easy study lies eligibility for a Signal Corps commission.

Several hundred men are currently enrolled in this advanced work. That enrollment is continuous, with a new section immediately taking the place of each graduating group. That is true, incidentally, of all the various courses except the part-time evening classes, which are offered coincidentally with the regular fall, spring and summer evening war training programs.

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A group of instructors in the radio courses. There are more than 100 members in the teaching staff.

Signal Corps Photo

UNINTENTIONAL SABOTAGE

By

Captain LAURENCE B. TIPTON

Gallant men died today—fighting your fight and my fight. Died in steaming jungles and arctic wastes—died in fox holes and flaming seas. Because we, the arsenal of democracy, have thus far sent them too little—too late.

Could you or I have made it different? Could factories straining every effort in America's behalf have turned out more planes—more guns—more shells today if we had let them?

Did you or I keep a bomber grounded—lacking just one vital part because the industrial soldier who makes that part was ill or hurt? Could we have kept him on the job to complete the making of that vital part?

Today waste of manpower has become treason. It has become sabotage. Because it can cost the lives of fighting men and postpone our ultimate victory. Because it steals production times from busy machines and robs us of those materials essential to the grim needs of war.

One of the most destructive attacks made on this nation last year was not made by saboteurs of a foreign enemy. This destruction, this delay, this waste of manpower and material was caused by loyal Americans giving everything they have to our nation's war effort but who still were "unintentional saboteurs". I say "unintentional saboteurs", for neither you nor I can say that we intend to be part of an accident—nor can we say that you or I would ever be so careless as to become involved in an accident—certainly not if we could only realize the extreme seriousness of accidents as they affect our war production.

If we could only realize that accidents are the real enemies of our war production, and last year left 101,500 dead, 350,000 permanently disabled, and 9,000,000 lesser casualties behind. This deadly saboteur cost as many productive man-days as would be required to build sixty-six battleships—approximately twice the number possessed by the combined American and British navies. It cost $3,750,000,000—enough to pay the entire cost of running New York City for six years. It culminated in the giant liner Normandie lying on her side in the mud of the North River—an 83,000-ton setback to the growth of the nation's seapower. In terms of lost instruments of war it is estimated that the 2,000,000,000 man-hours lost each year for the past two years were sufficient to build 500 destroyers, 600 submarines, 260,000 light tanks, 150,000 trainer planes, 100,000 fighter planes, 40,000 medium bombers, or 20,000 heavy bombers. In the words of the Secretary of Navy, Frank Knox, "Those hours weren't just unused; they were lost. They are a part of eternity. Perhaps in so-called 'normal' times, with business proceeding as usual, they could have been replaced with manhours drawn from the reservoir of the future with no irreparable damage to the security of our nation as a whole. Things are different now. The bomber that's delayed now may never be finished; the keel that's not laid now may never be laid; and the sixteen-inch rifle that in the turret of a battleship might speak its message to the foes of democracy in the only language they will ever understand may never be bored because the time that we need to build these things is no longer inexhaustible or replaceable from the future, but, instead, is ticking away now, as I talk, this minute and every minute of today and tomorrow and this week and next week. We no longer have the future to draw upon; we only have the present—and precious little of that."

In this war of production, every man and every woman we can put to work and keep at work is vitally needed. To permit the occurrence of an accident that keeps a worker away from his job for even a single day weakens our war effort and helps the enemy. To fail to prevent an accident that could have been prevented is as harmful as an act of sabotage. Accidents are caused by known conditions and known unsafe work practices. Some of the country's largest and best managed industries, by studying and removing these causes, have proven that accidents are largely preventable. There are tried and tested techniques within reach of every manufacturer which, if adopted and applied, could practically wipe out on-the-job accidents and occupational health disabilities.

Accomplishments in industrial accident prevention are strikingly shown by the records of many individual plants where everyone, from the executive to the lowest-paid worker, thinks of safety as an important part of his job. For example, a large chemical company operated 11,361,846 manhours without a single injury. A heavy machinery manufacturer in Massachusetts operated 7,019,736 man-hours without a lost-time accident. A large steel company in Cleveland, Ohio, had 5,325,144 injury-free man-hours. A textile plant in Newark, N. J., 6,792,695 had injury-free manhours. A large rubber-products manufacturer in Providence, R. I., had 5,688,369 man-hours without an accident. Since 1912 the steel industry has engaged in intensive safety activities which have resulted in a ninety percent reduction in the disabling accident rate. Through a program of safety engineering and education it is estimated that a total of more than 645,000 accidents have been prevented in the steel plants of the country alone.

These records prove what can be done when management seriously sets about the job of accident prevention. However, they form a striking contrast to the general picture of mounting manpower loss through work disabilities. In many cases management has been warned but still permits this sabotage of our war effort to continue.

What is needed now is not new information and research, but a greater distribution and acceptance of time-tested and proven systems and standards for the correction of factory damage and unsafe work practices. The development of a plant-safety program, the creation of safety-mindedness on the part of supervisors and workers is a management problem. Industrial executives generally need to be made aware of their accident problem and assisted in the details of a program of safety engineering and safety education. I am, therefore, calling upon all accident prevention agencies—public and private—to re-

(Turn to page 46)

BETTER MOUSE TRAPS

The crash of an airplane on a mountain side with all lives lost and no evidence of how or why the crash occurred may yet become a thing of the past. This development is suggested as a result of the method of sound recording recently evolved at the Armour Research Foundation. Recorded conversations between the pilot and co-pilot, between the pilot and his home port, and the background of engine noises which preceded the accident will assist investigators in eliminating future accidents of the same kind. This is possible because the new method is unaffected by vibrations or turning the recorder upside down and because the record is relatively indestructible.

Inventor of the new sound recorder is Mr. Marvin Camras, a member of the Foundation staff and a graduate in the class of 1940 of Illinois Institute of Technology. Chief among its new features is a recording head which, by spot magnetism, records along the wire symmetrically about its axis.

The electrical or magnetic method of recording is not entirely new. Valdemar Poulsen first applied in 1898 for patents on a method of recording sound on a wire. His experiments were successful in a degree but his methods were not found practical for commercial use. Some of the difficulties arose from the great size of the wire used and the high speed at which he found it necessary to operate the machine to secure any high degree of fidelity of reproduction.

Despite these difficulties, magnetic recording was found to have many advantages over other methods; the record did not have to be processed, which meant a saving in expense and

Marvin Camras, 1940, a member of the staff of the Armour Research Foundation, is shown operating a table-model radio to record music upon a steel wire. Mr. Camras is inventor of the wire sound-recorder shown in the center. Beyond, at left, is an oscillograph used for testing the performance of the recorder.

A comparison in size of the steel wire (below) used in the wire sound-recorder and a human hair (above).

time; the steel wire, when magnetized, could at once be played back, or it could be demagnetized and reused without any changes in the physical properties of the wire itself. Recordings on steel wire had the further advantage of being relatively indestructible from breakage or fire. The record could not be removed, in fact, except by de-magnetization. It did not wear out easily. Even today, the earliest magnetic records are playable, and it is reported that a magnetic record has been played 200,000 times without destroying it.

Experiments in the field of magnetic recording continued with some degree of success. The recording was at first made by a single magnet along one portion of the wire. One of the greatest difficulties was found to be a certain fuzziness in the reproduction of the sound. The tendency of the wire to twist during the operation of the recorder led to a distortion of the sound. To avoid this, a tape recorder which was flat and therefore not subject to torque was developed and came into wide use wherever a magnetic recorder was desirable.

It was in 1939, while Mr. Camras was still a student at Illinois Tech, that he attempted to construct a magnetic recorder. Being unable to secure steel tape, he turned to the metal that was available and began experimenting with wire. Achieving some degree of success, upon graduation he brought his idea to the Armour Research Foundation. He joined the staff and worked part-time upon the development of the recorder. His chief improvement over previous types was a method of recording symmetrically about the wire.

As the invention took form, the Armour Research Foundation authorized Mr. Camras to devote his full time to this development and gave the assistance of other members of the staff and adequate equipment and materials. This action was taken after thorough patent studies which showed that such an investment would be justifiable.

The recorder then developed was used in Professor Walter Hendrick's public speaking classes at the Illinois Institute of Technology and received generous praise for its effectiveness there. It was tested under varying conditions and found unusually practicable for radio recordings. It was not until the recorder was tested on a nationwide broadcasting system that press services became interested in it and gave it nationwide publicity.

The Armour Research Foundation was at the time and has since been producing a limited number of experimental machines for the military forces of the United States. It expects that all machines which it is possible to produce during wartime will be devoted to aiding the war effort. When the present world conflict is over, wire sound recorders should come into wide use for various civilian purposes.

One of the new recorder's advantages over other types is the small amount of material used for the record and the small amount of storage space needed. At present, a wire of 0.004 inches in diameter is used for the record. The most interesting feature to many laymen is the automatic removal of an old record as the new record is made.

Theoretically, there is no limit to the uninterrupted operation of a recorder of this type. Recordings of one hour in length have already been made, and an eight-hour recorder is now being constructed. This feature is of especial value where frequent changes of records have, in the past, been necessary. Long symphonies, for example, could be recorded upon a single wire by using the Camras recorder.

The reusable features will appeal to business men who frequently need a record only for a single playback for the purpose of transcription and must re-process or shave the record before reusing. The Camras machine is unaffected by vibrations or by its position, factors which limit the use of other types of recorders. It could, therefore, be used by a business man to dictate while traveling on airplanes, railroads, or buses and the record could then be mailed back to his stenographer at small expense. Recording business telephone conversations for later reference is also a valuable application.

Since the first announcements of the recorder's development, a large number of suggested applications have been received at the Foundation. Among them are: present military uses; recording in the home, in education, at the office, in aircraft, in motion pictures, in radio broadcasting; and a wide variety of novelty uses.

In the home, the machine will, undoubtedly have a large number of uses. The owner, planning to be out for the evening, could adjust it to record a favorite comedian, a concert, or a ball game which he is anxious not to miss.

One of the novelty use suggestions came from a blind organist who wrote to the Foundation that he had to record radio music so that he could play it over and over again in order to memorize it. A reusable record, he said, would be invaluable to him.

L. R. OAKS

HELP!

HELP!

HELP!

The entire engineering class which graduated last May is at work. Forty-four of its members at the last reckoning have entered military service. Nearly 700 of our alumni are now in the service.

The placement department was fortunate, because of the urgent demands for engineers, to be able to put to work quickly all our lads released from non-defense industries and those released at the conclusion of assignments. Numerous alumni were furnished many leads throughout the year that enabled them to procure better positions carrying more pay and responsibility. Also numerous alumni were aided in obtaining officers' commissions and positions with the government requiring special attainments.

Taking into account part-time jobs and the placement of alumni, nearly 700 men were placed through this department, exclusive of the graduating class of 1942.

There are no graduate engineers registered with this department as out of work except a few in the process of changing jobs.

The statistics relative to salaries of the graduating class of 1942 are herewith given. The salaries are based on a forty-hour week without overtime pay. Salaries of commissioned officers and of co-ops have been excluded. These would considerably raise the average monthly salary of the class.

Department	*Per Cent Employed*	*Average Initial Monthly Salary*
Agricultural	100	$158.15
Chemical	100	150.42
Civil	100	151.85
Electrical	100	151.22
Engineering Science	100	175.00
Fire Protection...	100	159.05
Mechanical	100	152.87

Average Initial Monthly Salaries For The Class Of:

1938	$100.00
1939	110.00
1940	119.20
1941	139.20
1942	152.60

Graduate Students Placed By This Department:

1941 (16)	$136.00
1942 (11)	186.45

Since there will be other jobs calling for special attainments reported to this department, won't you comply with our repeated requests to send in for a placement form, answer its questions and mail it back? Fewer than half of the alumni are accounted for in this department. If you desire a change or are out of a job and want work, or want a recommendation for a commission or a job, these placement records properly filled out and available in our office will help you and will help us.

This office has received many calls every day about the draft status of engineers. There has been no change regarding the shortage of engineers as listed in Bulletin No. 10, issued June 18, 1942 by General Lewis B. Hershey, National Director of the Selective Service System. Acute shortage of engineers in all branches still exists, as indicated by the thousands of jobs for engineers and teachers available in our office. Every day brings numerous requests for engineers and teachers urgently needed. The requests come by mail, telephone, telegram and personal calls at the office of the placement department.

The boards are becoming tougher and many more engineers are being placed in 1-A. Numerous appeals must be made to local appeal boards and to the national appeal board.

On the one hand the 6,000 local boards of the Selective Service System are exhorted to fill the quotas of registrants needed for the Army. On the other hand industry is exhorted to increase production of war materials and to expand, build, and speed up production of more war materials. The armed services and industry need trained men and trainees. Many more factories are being erected, and the Army, Navy, and Air Forces are to be greatly expanded to—well, that's a military secret. But it is no secret that the country will need many more engineers and men of science to man the factories that cannot be run by remote control, to fill the jobs in research laboratories, and to serve as officers on non-combatant and combat duty. Surgeons, physicians, meteorologists, physicists, engineers of all kinds, and men of many other professions, trades or callings involving special attainments are desperately needed.

For all this there are not enough men. So women and older men must be trained for military service, to man the factories and do a man's job wherever they can fit in according to physique or professional training. This will mean that many millions of women must go to work in factories and to jobs requiring special skills. A potential source of female help will be the twenty-nine million married women in the Unted States.

So it is going to be tougher and tougher if the war lasts a long time, for an engineer, of draft age and physically fit to qualify as a "necessary man" in a "critical occupation". This will mean, then, the armed forces for you.

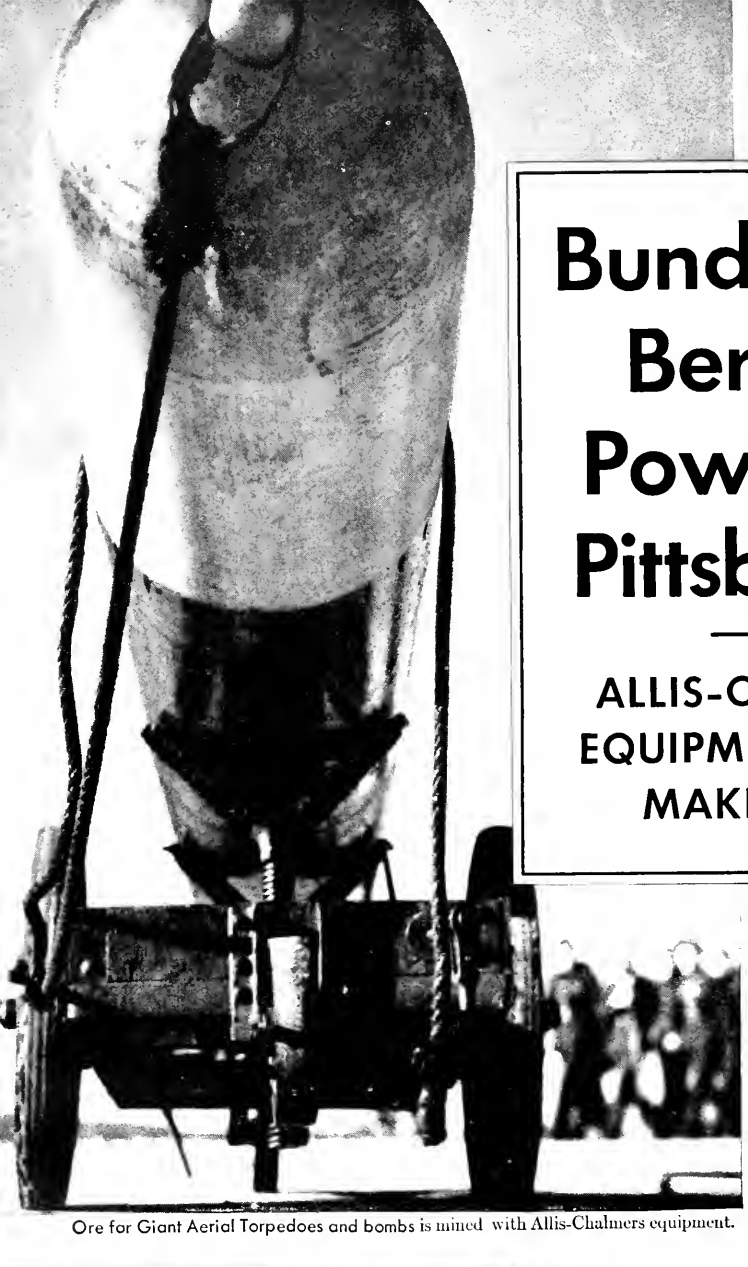
Yet if production lags or breaks down in spite of the aid of millions of women, and essential engineers are needed, there can be only one recourse —allocation of trained engineers from the armed service back to industry.

JOHN J. SCHOMMER.

One of many new Allis-Chalmers ste
turbines which are helping to power
greatest war production effort in hist

Bundles for Berlin... Power for Pittsburgh!

ALLIS-CHALMERS EQUIPMENT HELPS MAKE BOTH



Ore for Giant Aerial Torpedoes and bombs is mined with Allis-Chalmers equipment.

"A. HITLER, BERLIN, GERMANY That's what we'd like to label just one of t thousands of tons of ore which Allis-Chalme equipment is helping to mine and turn in aerial torpedoes and bombs!

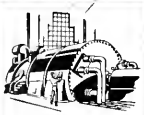
And that turbine above is another All Chalmers product that will soon be turni out trouble for Hitler—supplying power great war plants—helping to make Americ soldiers the best equipped in the world.

These are just two examples of how the

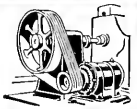
ALLIS-CH

OFFERS EVERY MANUFACTURER EQUIPMENT AND ENGINEERING

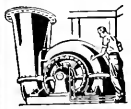
ELECTRICAL EQUIPMENT



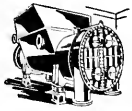
STEAM AND HYDRAULIC TURBINES



MOTORS & TEXROPE V-BELT DRIVES

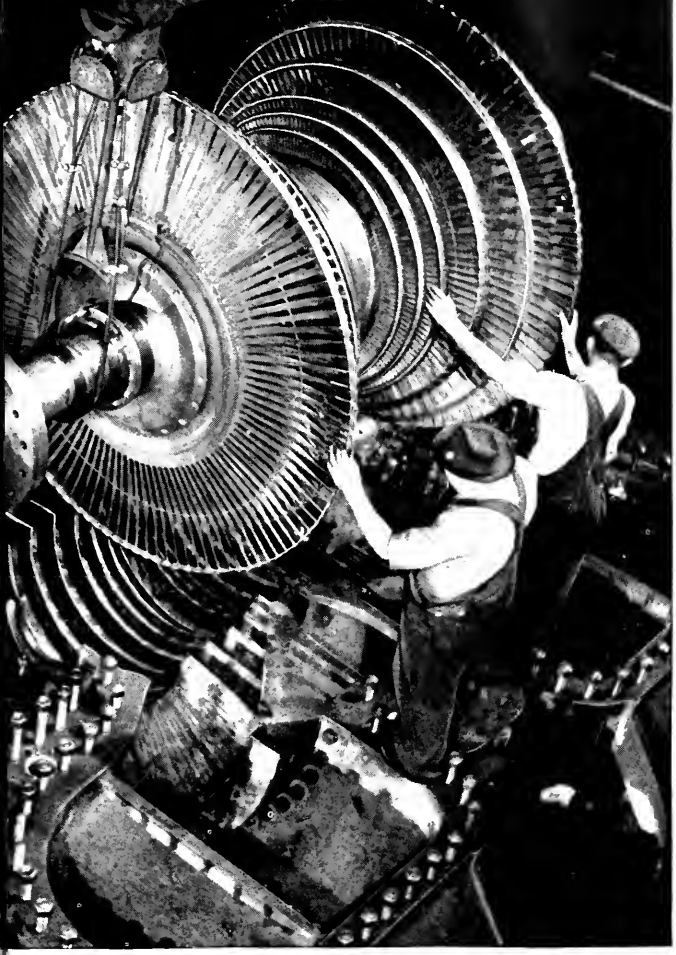


BLOWERS AND COMPRESSORS



ENGINES AND CONDENSERS

CENTRIFUGA PUMPS



of Allis-Chalmers people are fighting
xis—are *working for Victory!*
er 1,600 Allis-Chalmers products are
ng in the Battle of Production. And our
erative Engineering service is helping
rs *produce more*—not just with new ma-
s, but with *machines now on hand!*
is production experience will be of added
when the war is over. We work for
ry—we plan for Peace!
-Chalmers Mfg. Co., Milwaukee, Wis.

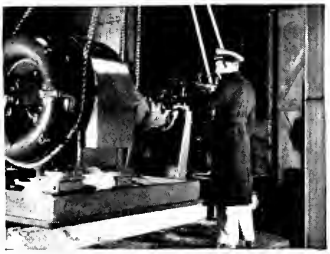
8 out of 10 loaves of bread in U.S. are made with the aid of A-C farm and flour mill equipment.

VICTORY NEWS

Washington, D. C. — Keels for more than 140 "Liberty" ships have been laid and more than 60 ships have been launched from ways which did not even exist before 1941. Original schedules have already been more than doubled.

To set the fastest shipbuilding record in history, mass production principles are used. More than 500 makers are feeding parts to Liberty ways.

From Allis-Chalmers, one of the most important of the contributing firms, comes products ranging from machine-gun cooling pumps to propulsion shafting.



Three-Stage High Speed Pump is inspected as it leaves A-C shops for a military destination. Equipment includes Allis-Chalmers motors and switchgear.

Milwaukee, Wis. — Mosquito boats no longer have to use their motors to recharge their batteries—small Allis-Chalmers rectifier units now do this job.

This unit is the newest means of obtaining nominal d.c. current from existing a.c. power lines. It eliminates need for keeping ships motors running for battery charging on shore. It also aids coast defense by helping to supply power for shore searchlights.

Industrial plants are also using the new unit to supply small amounts of d.c. for individual drives on planers and other machines, in laboratories for testing purposes, and in tool rooms.

FOR VICTORY
Buy United States War Bonds

ALMERS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

ATION TO HELP INCREASE PRODUCTION IN THESE FIELDS...

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EQUIPMENT

CHEMICAL PROCESS
EQUIPMENT

CRUSHING, CEMENT &
MINING MACHINERY

BOILER FEED
WATER SERVICE

POWER FARMING
MACHINERY

INDUSTRIAL TRACTORS
& ROAD MACHINERY

THE BOOK SHELF

Elementary Structural Analysis and Design, by Linton E. Grinter. The Macmillan Company.

This text is designed for students in non-structural courses, and its publication is evidence of a trend toward giving a short course in structural design to students in other branches of engineering. Since buildings and other structures are involved in most engineering projects, it is likely that engineers in all fields will at times be concerned with the design, alteration or maintenance of buildings and appurtenant structures, and should have sufficient understanding to deal intelligently with such matters, though they may not be called upon to design large or complicated buildings.

This book gives the fundamental theory and the practical procedures for the design of structures, particularly buildings, in timber, structural steel, and reinforced concrete. Emphasis is laid upon specifications and Building Code provisions for design in these materials. Liberal extracts from the latest authoritative society specifications are included. Practically all examples worked out in the book are in accordance with current specifications.

Because of the evident demand for brief texts on structural design, several have been published in the last few years. Dean Grinter's is perhaps the most complete and comprehensive covering this field. Much of the material has been taken from the author's previous texts, *Stresses in Modern Framed Structures* and *Design of Modern Steel Structures.*

ROE L. STEVENS

Elements of Heat Transfer and Insulation, by Max Jakob and George A. Hawkins. John Wiley and Sons, New York, 1942.

A great many text books on heat transfer have been published or revised in the last few years, and there has been a great deal of duplication of effort. As the competition is so keen, only those texts which are superior for a given purpose will find use commensurate to the cost of their publication. This book, by Max Jakob and George A. Hawkins, should find general use for undergraduate courses as it is probably the best work in the field for this particular purpose.

Each chapter in this text has an excellent selection of problems at its end and has a great many illustrations throughout. A student can listen to or read all the theory available on heat transfer, but unless he works a great many problems, he cannot use his knowledge. Theory is quickly forgotten in most cases.

The first few chapters deal with conductivity, the most logical subject with which to start. Great pains are taken to simplify these elementary chapters and yet present the material in a satisfactory fashion.

Materials such as insulation, building supplies, and metals are described, and their practical application is discussed as it relates to heat transfer. Everything from chemical composition to variation of conductivity with temperature is tabulated.

Although the authors have attempted to limit the material in the main to fundamentals, some advanced theory is presented very well. An example of this work is the chapter on the unsteady state. However, the writer questions the advisability of taking up such material in the average undergraduate course.

If this book is to have wide circulation, it must compete with such books as *Introduction to Heat Transfer* by Brown and Marco,[1] or the second edition of *Heat Transmission* by McAdams.[2] The latter volume is devoted chiefly to a resumé of the literature, and it finds value mostly as a reference text rather than a book for an undergraduate course. The book by Brown and Marco, on the other hand, is written as an elementary undergraduate text and has many desirable features. That these McGraw-Hill books both use feet, hour and pound-mass as units in their illustrations will find favor with a great many engineers. Most examples in the Jakob-Hawkins text use feet, hour and slugs, which at first seems a little strange. After a student has become accustomed to McAdam's method, it will take a great deal of thought and work to switch units. The usual result is that each instructor goes ahead and uses the units to which he is accustomed. This fact may reduce the usability of the Jakob-Hawkins text, especially in the chemical engineering schools. The redeeming feature, in this case, is the fact that the units are very well explained, which will help a great deal.

Dimensional analysis is taken up in a very effective manner, and the usual dimensionless groups are discussed. This reviewer looks with skepticism on a great many correlations that are presented in the literature. Many texts present most of these papers without regard to the probable errors involved in the method. The only criticism here is that the dangers of this method of handling problems are not as completely discussed as might be desirable. The material given in this book, however, is only that which has stood the test of time.

The chapter on condensing vapors is rather short and Nusselt's work is given very little space. The reviewer would liked to have seen this chapter expanded a great deal, but that is only a matter of opinion. An author cannot include everything in an elementary text, so some material has to be eliminated. For example, the book by Brown and Marco also gives only a few of the final equations on this subject.

The usual appendix containing pertinent heat transfer data is missing from the Jakob-Hawkins text. The authors have preferred to distribute the tables throughout the text; tables of contents early in the book constitute a guide to this material and to figures needed for numerical calculations.

Chapter IX entitled *Heat Transfer by the Combined Effect of Conduction and Convection* is far superior to similar chapters in other texts in this field. This subject introduces the student to the mathematics of heat transfer in a very logical fashion and illustrates the value of differential equations for advanced work in the field. Most of this material isn't mentioned by Brown and Marco.

The book has a great deal of material which is well presented, and it should find wide use in colleges throughout the country.

R. E. PECK.

1. A. I. Brown and S. M. Marco, *Introduction to Heat Transfer,* McGraw-Hill, 1942.
2. W. H. McAdams, *Heat Transmission.,* Second Edition, McGraw-Hill, 1942.

Metropolitan Government, by Victor Jones. University of Chicago Press, 1942.

Professor Jones has made a comparative study of the governmental problems of a number of metropolitan areas throughout the world and in this volume points out the factors which

(Turn to page 46)

COMMUNICATIONS
. . . directing arm of combat

"Get the message through!" That's the tradition of the men who wear this insignia. Of the 18,000 Bell System people now in the armed forces, nearly 4,500 are with the Signal Corps. Young men can serve their country and obtain specialized training in communications in this great branch of the Army.

...and Western Electric equipment goes to every battle front

Army planes fly and fight with Western Electric radio command sets, which keep the planes of a squadron in contact with each other and with the ground forces.

Wherever American soldiers fight in tanks, they get their orders over Western Electric radio sets—vital in coordinating today's mechanized warfare.

Observers report front-line action to Army commanders over Western Electric field telephones, field wire, field switchboards.

A major source for this specialized equipment is Western Electric—for 60 years manufacturer for the Bell System—one industry with over 70,000 skilled men and women dedicated to *"keep 'em in contact."*

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ARSENAL OF COMMUNICATIONS

ARMY E NAVY

FROM YEAR TO YEAR

A RECORD OF OUR ALUMNI AROUND THE WORLD

MAN OF THE MONTH

As its nominee for the Man of the Month, the ENGINEER presents Philip Harrington, who, more than any other man represents transportation in the City of Chicago and Cook County. Among his multifold duties, he is Commissioner of Subways and Superhighways for the City of Chicago, Chief of Communications in the Chicago Area for the Office of Civilian Defense, and Administrator for the Office of Defense Transportation in the Chicago Metropolitan Area.

Harrington was born in Worcester, Massachusetts, on January 28, 1886, and was brought to Chicago in 1892. He attended Shields Grammar School on the south side of Chicago. He was graduated in 1902 from Lake High School, which is now Tilden Technical High School, where he took part in inter-scholastic baseball, basketball, and football. In the fall of 1902 he entered Armour Institute of Technology in the Department of Electrical Engineering.

At the Institute, he took active part in class activities, and was Vice President of his senior class. He played inter-class baseball and basketball, and was a member of the varsity baseball team in 1905 and 1906. His position was short-stop, where he did a creditable job, not only as a fielder but as a hitter as well. His thesis for graduation was entitled, *Permeability of Magnetic Irons and Alloys.*

His first position after graduation from Armour was as a member of a crew completing a topographical survey of the Illinois River. In commenting upon the shift from electrical engineering to work that was largely that of a civil engineer, Harrington

HARRINGTON

recalls that the business conditions of 1906 were such that a young engineer preferred to receive any employment in any field, rather than to wait for a position in his own field of training. He next joined the engineering staff of the Sanitary District of Chicago, and started work as a rodman, working through practically all positions to Chief Engineer, which latter position he reached in 1933. In his almost thirty years of service with the Sanitary District, he directed the design and construction of important sanitary facilities that were of great benefit to persons living in the metropolitan area of Chicago.

While employed by the Sanitary District, he found time to attend the Kent College of Law, and was awarded a law degree in 1915. He was admitted to practice before the Illinois Bar in 1916. He has never engaged in the actual practice of law, but his legal training has proved most helpful, especially in the many contract discussions he has had with builders and city and county officials.

The second metamorphosis in Harrington's career occurred in 1933 when he was appointed a special traction engineer by the City of Chicago to study and present a plan covering the local transportation situation in the metropolitan area. Although seven plans had been presented in the preceding thirty-five years, his *Comprehensive Local Transportation Plan for the City of Chicago,* which was presented in November, 1937, was found acceptable by the City Council of Chicago. This report covered more than 264 pages of type, and included some 60 diagrams and pictures. He was made Commissioner of Subways and Traction for the City of Chicago on November 3, 1938. Harrington's plan was the first to lead to actual construction of subways in Chicago, and when entirely completed will place metropolitan Chicago almost at the top of all cities in the world, so far as local transportation is concerned.

On January 1, 1940, he was appointed Commissioner of Subways and Superhighways for the City of Chicago, and in this position prepared a comprehensive superhighway plan for Chicago. This report was presented in October 1939, and caused much comment from traction engineers. A further report covering the extension of the subway system was completed in 1939, and this embraced the extension of facilities now under construc-

tion in Chicago's Loop and scheduled for completion in January 1943.

The State Legislature of Illinois, recognizing the need for coordinating the transportation systems of the City of Chicago and of Cook County, appointed a five-man commission to study present facilities and outline plans that will include expansion to the rapidly increasing suburban areas around Chicago. Harrington is a member of this commission, and his wide experience in handling the Chicago local transportation problem should prove invaluable to this group who have broad powers in placing in actual operation a super-highway system that will cover all metropolitan needs.

He has always had a great interest in Institute affairs, and served on the Alumni Board of Managers from 1936 to 1939. Although he was much interested in alumni work, the pressure of time would not permit him to take a very active part in its actual conduct. He has manifested his interest in Armour and Armour men in a substantial way by hiring Armour graduates for positions under his direction, and by recommending them for work in other offices where their experience and training could be used to best advantage. A survey made of his engineering staff while he was Chief Engineer of the Sanitary District of Chicago reveals that more than forty men were graduates of Armour, indicating Harrington's preference for properly trained engineering graduates.

On June 18, 1942, Harrington was given the Distinguished Service Award of the Armour Alumni Association at the annual meeting at the Stevens Hotel. In accepting the award, he pointed out the increasing need for young men, technically trained and imbued with a spirit to complete the toughest job. He indicated that the accomplishments of the American engineer would determine the victor in the present world struggle and would hasten victory for the United States.

The Second World War has made his job as Commissioner of Subways and Superhighways more difficult because of priorities and other war regulations, but nevertheless he has undertaken other duties that are vitally important in the war effort. He was appointed Chief of Communications for the Office of Civilian Defense, and it was his responsibility to devise an air-raid warning system for the Chicago Metropolitan Area. It remains his duty to supervise the operation and maintenance of this equipment for the duration. He has been made Administrator for the Office of Defense Transportation, and has charge of conservation of vital war transport facilities in the Chicago Metropolitan Area. This position involves a study of all types of transportation facilities and may result in a complete rescheduling of such facilities to give the greatest possible service with the least use of vital equipment.

There is before the Illinois Commerce Commission at the present time a plan for the reorganization, the unification and the modernization of all transportation facilities in Chicago. This study was directed by Harrington and involves the very difficult legal problem of converting the present elevated, street car and bus facilities into a single operating company.

It is not often that a man can move from one engineering field to another and successfully handle the problems involved in the new field. Yet Harrington has successfully covered the fields of electrical, civil and traction engineering. That he might have been a successful lawyer is left to conjecture, but it is to be assumed that in the field he would have made a creditable record.

He is a member of the Chicago Street Traffic Commission, the Chicago Plan Commission, the American Society of Civil Engineers, and the Western Society of Engineers. He is a member of the Chicago Athletic Association and the Crystal Lake Country Club.

He finds time to play golf, which is his main summer recreation. In the winter, toppling the maple pins provides sufficient exercise to keep him in trim, and he admits to playing an occasional poker hand, largely for diversion.

Mr. and Mrs. Harrington live at 434 Melrose Street, Chicago; his office is at 20 North Wacker Drive.

A. H. Jens

ILLINOIS TECH ALUMNI ASSOCIATION

The Alumni Association of Illinois Institute of Technology has been established, under the direction of an Acting Chairman and Board of Directors.

J. Warren McCaffrey, Ch.E., A.'22, as Acting Chairman, presented the Constitution to sixteen hundred alumni for their approval at the Institute's Board of Trustees' dinner for the alumni held February 20, 1942 in the Grand Ballroom of the Stevens Hotel. By an almost unanimous vote the Constitution was accepted, and the Alumni Association of Illinois Institute of Technology became a reality.

During the months preceding this meeting, after the consolidation had taken place, much work preparatory to the establishment of the new alumni association had been done by the Acting Board of Directors under the leadership of Mr. McCaffrey. Working with him on this board were the following representatives of the merged bodies and of Illinois Institute of Technology: Earl G. Benson, M.E., A.'25, Adolph H. Fensholt, M.E., L.'13, Arthur R. Lake, M.E., L.'24, Stanley M. Lind, Ch.E., A.'32, Alexander T. Reynolds, M.E., I.'41, Mrs. Alexander T. Reynolds (Lillian Snodgrass) A.S., I.'41, James T. Waber, Ch.E., I.'41, and Sydney B. Westby, E.E., L.'33.

Since the formation of the new Illinois Tech Alumni Association eighteen meetings in eleven different cities have been held by newly-formed alumni clubs.

Many other meetings have been held in connection with the First Annual Illinois Tech Alumni Fund, which has reached $50,000 contributed by 2,600 alumni. Six hundred and forty-four enthusiastic members of our alumni association, taking part as chairmen and workers in our nation-wide alumni fund, have carried the inspiring story of our institution to its alumni throughout the country.

ARMOUR ALUMNI AT ANNUAL MEETING DISCUSS NEW ASSOCIATION

At the annual Spring Meeting of the Armour Alumni Association held at the Stevens Hotel on June 18, 1942, more than 100 alumni took part in activities that included election of officers and presentation of awards.

In reporting on the year's activities, retiring President McCaffrey outlined the history of the formation of the Illinois Tech Alumni Association, and reported on the action taken by the Armour Advisory Council, which had met several weeks earlier. McCaffrey reported that the Advisory Council were on record to the effect that the Armour Alumni Association should be disbanded as soon as practicable but had not recommended a date when such action should be taken. There was a short lively discussion on this matter, but it was decided to refer it back to the Board of Managers for further study and report.

The impressive list of recipients of the Distinguished Service Award of the Armour Alumni Association was increased by the addition of the name of Philip Harrington, E.E., '06, who was rewarded for his outstanding work as a civil and traction engineer.

Two Armour Alumni Service Awards were presented by William F. Sims, E.E., '97; the first to retiring President, J. Warren McCaffrey, Ch.E. '22, for his untiring efforts in the conduct of alumni affairs over the past years, and more especially for his organizational work and direction of the annual gift program which was started in 1938. The second of these awards was presented to William M. Setterberg, Arch., '29, who served four years as Secretary-Treasurer of the Association, and who made a fine record in the handling of the Student Loan Fund.

The following officers were elected for a two-year term: A. A. Knuepfer, C.E., '15, President; A. H. Jens, F.P.E., '31, Vice President; G. H. Von Gehr, E.E., '28, Secretary-Treasurer. Elected for a four-year term to the Board of Managers were the following:

Representing Classes 1897-1901, W. F. Sims, E.E., '97;

Representing Classes 1907-1911, E. F. Pohlmann, Ch.E., '10;

Representing Classes 1917-1921, J. W. McCaffrey, Ch.E., '22;

Representing Classes 1927-1931, John Hommes, F.P.E., '29;

Representing Classes 1937-1941, A. P. Schreiber, Ch.E. '37.

At the conclusion of the formal meeting, the group was served a buffet supper, after which informal discussion was carried on.

A. H. Jens

1900

Ballard, Walter L., Ac. L., in a letter under date of September 3, 1941, from 15 Liberty Parkway, Dundalk, Maryland wrote as follows:

Dear Sir:

Enclosed please find a check for the Alumni Fund from a member of the Class of 1900. Today Maryland is my adopted state. I have lived on the outskirts of Baltimore City for the past twenty years. During all of that time I have worked for the Bethlehem Steel Company at their Sparrows Point Plant. Mrs. Ballard and I have two grown children—a son and a daughter and our daughter has given to us two active grandsons.

It may be of interest to you to know that our only son became interested in aviation and volunteered for training as an air cadet. He received his training at one of your own Illinois Air Fields—Chanute Field. He received his commission and is now one of the engineering officers at Shaw Field, Sumter, South Carolina.

Wish you success in your efforts toward an enlarged Illinois Institute of Technology.

Sincerely,

(Signed) Walter Lane Ballard.

Dunham, George F., Arch. A., is an architect, specializing in homes and churches. His business address is Box 205, Orlando, Florida. His home is at 1131 Oxford Road, Winter Park, Florida.

1911

Cheney, Howard L. Arch. A. is a Major in the United States Army Air Force. His present address is 3031 Sedgwick Street N. W., Washington, D. C.

1914

Burnham, Colonel Clifford L., M.E. A., who is a consulting industrial engineer, has been given an indefinite leave of absence by the Advisory Board of the Chicago Ordnance District, of which he has been a member and consultant to the Ammunition Division since Pearl Harbor. Colonel Burnham is on active duty in the Field Artillery. He is a member of the Delta Tau Delta and Eta Kappa Nu Fraternities.

1917

Loewenberg, Max L., C.E. A., is a Captain in the 347th Regiment of Engineers. His home is at 2842 Sheridan Road, Chicago, Illinois.

1918

Mathews, Ralph H. G., E.E. A., according to a recent news release, is Commander in charge of Navy recruiting for the Indiana area. He is a former Chicago advertising executive who regards Navy recruiting as a selling job, and the recruiting results in Indiana justify that point of view. Commander Mathews may be reached at U. S. Navy Recruiting Station, Post Office Building, Indianapolis, Indiana. His home address is Lawrence Drive, Brendonwood, Indianapolis.

1919

Korman, Mrs. Alvin L. (Gladys L. Weille) H.E. L., writes she is a member of the City Nutrition Committee in Nashville and has conducted a course in Nutrition and in Mass Feeding under the auspices of the local Red Cross. Her residence is Elendale Avenue, Nashville, Tennessee.

1923

Geisler, E. Walter, F.P.E. A., who for over ten years has managed the Pittsburgh office of Fred S. James & Company, has been elected a vice-president of the company. Mr. Geisler's election was made on his twentieth anniversary with the James organization. He resides at 26 Academy Avenue, Mt. Lebanon, Pittsburgh, Pennsylvania.

Mayo, Robert S., C.E. A., writes that because of priorities he has closed down his tunnel equipment business and is now chief engineer of the Wiley Equipment Company, Port Deposit, Maryland, builders of large-capacity Whirley Cranes and steel barges. He resides at 1425 Hillcrest Road, Lancaster, Pennsylvania and commutes daily to Port Deposit.

Price, Myron H., Ch.E. A. A letter to the alumni office under date of July 6, 1942 from Mrs. M. H. Price, 245 Carey Street, Hampton, Virginia, is as follows:

Dear Sir:

Regarding your request of June 27, addressed to Major Myron Hawley Price, Adjutant General's Department (Ch.E. A 23), I am enclosing herewith a highly valued little picture of Major Price, which he gave me before he left for duty abroad with the Air Force.

I am sure he would wish for his copies of your publications to be sent to a camp library, although I should like a copy of the one in which his picture will appear. Could this be arranged without too much trouble?

If I can be of any service to any of the alumni who find themselves in this vicinity, please let me know. This is a very crowded defense area as you no doubt know, and sometimes the problems of obtaining a good dinner and a room loom large. My home is theirs.

Sincerely,

(Signed) Mrs. M. H. Price.

1924

Kinsman, George C. M.E. A., is a Lieutenant serving with the United States Naval Reserve at a Submarine Base.

Sikes, Alfred W., M.E. L., is a Lieutenant-Colonel in the Chemical Warfare Service.

1925

Baldwin, William H., F.P.E. A., is employed as special agent for the New York Underwriters Insurance Company, 312 Guardian Building, St. Paul, Minnesota. He resides at 4152 Beard Avenue South, Minneapolis, Minnesota.

Green, Louis S., F.P.E. A., is a Captain in the United States Army Engineers. His mailing address is: c/o Postmaster, A.P.O. 922, San Francisco, California.

1926

Schoenwolf, Fred L., E.E. A., Lieutenant in the United States Navy, has been reported missing since the fall of Corregidor. He previously had been stationed at the Naval Base, Cavite, Philippine Islands.

1927

Coy, William M., Ch.E. A., is a Lieutenant, United States Naval Reserve, Bureau of Aeronautics, Navy Department, Washington, D. C.

Green, James D., C.E. A., has recently been promoted to assistant secretary in the Real Estate Department of the Northern Trust Company, 50 S. La Salle Street, Chicago, Illinois. His home is at 3133 Princeton Avenue, Chicago.

Taylin, Samuel, E.E. A., is employed at Rock Island Arsenal, Rock Island, Illinois.

1928

John T. Even, F.P.E. A., has been appointed general agent in charge of the brokerage and Cook County departments of the Firemen's Fund Insurance Company, 175 W. Jackson Boulevard, Chicago, Illinois.

Nelli, Humbert O., A.S. L., is now Commanding Officer, Civilian Conservation Corps, Camp Blackwell, Wisconsin.

Willis, Ernest W., F.P.E. A., has been appointed assistant manager of Western Factory Insurance Association, 175 W. Jackson Boulevard, Chicago, Illinois. His home is at 9137 S. Pleasant Street, Chicago.

1929

Friedman, Theodore W., C.E. A., who is a Lieutenant, U. S. Naval Reserve, is on active duty with the Civil Engineer Corps.

La Piana, Vincent Frank, Ch.E. A., is Captain, Chemical Warfare Service.

1930

Haley, Henry R., F.P.E. A., who is a Second Lieutenant, Quartermaster Corps, Headquarters Company, 2nd Division, is stationed at Fort Sam Houston, Texas.

1931

Auerbach, Captain Alvin B., C.E. A., is Commanding Officer of the 86th Engineer Battalion (Heavy Ponton).

Gilbert D. McCann, Ph.D., M.S.
...Master of Thunderbolts, too!

MODERN FARADAY CAGE. Three million volts of man-made lightning bit a car in Westinghouse High Voltage Laboratories, while Dr. Gilbert D. McCann sits safely at the wheel. Dr. McCann . . . co-inventor of the "fulchronograph" for timing and measuring the intensity of thunderbolts . . . joined Westinghouse in 1939, after receiving degrees of M.S. and Ph.D. at the California Institute of Technology.

EVERY TIME you take a breath, 175 thunderbolts crash to earth somewhere.

These lightning strokes, streaking down at 600 million miles an hour, are charged with torrents of electrical power . . . as much as 200,000 amperes, at pressures as high as 25,000,000 volts.

No wonder protection against lightning has been a major problem to utility companies . . . such a problem that, up to a few years ago, lightning frequently shut down power service to industry.

Today, a properly designed power line is not likely to be put out of service by lightning *more than once in 5 or 10 years!*

Dr. Gilbert D. McCann and Charles F. Wagner, Westinghouse engineers, have done much to make this possible through their studies of natural thunderbolts and laboratory lightning.

One of their contributions is the "fulchronograph" which automatically times natural lightning strokes and measures their intensity. Oscillographs and movie cameras also are used to photograph the celestial fireworks.

These mechanical "eyes" . . . perched high on the top of scores of tall buildings, smoke stacks, and transmission-line towers . . . are constantly collecting facts about lightning phenomena that were never known before. Facts about "cold" lightning, of terrific blasting power. Facts about "hot" lightning, the incendiary bomb of the sky.

Still further knowledge is gained from the study of *artificial lightning* . . . made in the Westinghouse High Voltage Laboratories. This man-made lightning is used to bombard insulators, lightning arresters, and other protective devices to test their efficiency.

These studies are constantly adding to the store of "know how" in the field of power transmission. As a result, Westinghouse engineers have been able to design and build lightning arresters and ground-wire systems that tame the wildest thunderbolt.

The work done by Dr. McCann is contributing mightily to America's war effort by helping to keep electric power flowing night and day to our vast war industries . . . as well as by protecting ordnance plants from destruction by lightning.

America needs scientists and engineers as never before . . . to help solve the technical problems of modern warfare and to rebuild the world when the last shot is fired.

Nearly 300 young engineering graduates joined Westinghouse last Spring to carry on this work. In the Class of '43 there will be many graduates who will have an equal chance to help win the war . . . and the peace to come . . . with Westinghouse.

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Lindquist, Bert S., C.E. A., is Resident Officer-in-Charge of a Naval Ammunition Depot.

Schrader, William A., E.E. A., recently resigned his former position as senior air carrier inspector (radio) with the Civil Aeronautics Administration and accepted a position as chief of communications of American Export Airlines, Inc., as of August 15, 1942. His business address is American Export Airlines, La Guardia Field, Jackson Heights, L. I., New York. His residence address is 31 Charles Street, Oceanside, L. I., New York.

1932

Wiltrakis, Edward J., C.E. A., is Captain in the United States Army Engineers.

1934

Bacci, Joseph Albert, C.E. A., who is with the United States Army, is detailed to engineering duty.

Kelch, Thelford E., M.E. A., has been stationed at Camp Grant, Illinois, since entering the service June 18, 1942.

Kropp, Arthur E., C.E. L., has been assigned to Co. A., 28th E.R.T.C., of the United States Army.

Swanson, Robert W., F.P.E. A., is an Ensign and may be reached at B.O.Q., Fargo Barracks, South Boston, Massachusetts.

1935

Friede, Richard L., E.E. A., is a Lieutenant in the United States Navy Air Service.

Hopkinson, Edward A., E.E. A., is a Lieutenant in the 363rd Infantry.

Hudson, Kenneth H., E.E. A., is in Battery G, 265th C.A.

Parkhurst, Orville J., A.S. L., is assistant chief in the Chicago Engineer Procurement District Engineer Headquarters, 222 West North Bank Drive, Chicago, Illinois. His Home address is 1146 South Cuyler Avenue, Oak Park, Illinois.

1936

Alderman, Jerome C., C.E. A., is a First Lieutenant in the United States Army Engineers.

Boberg, Charles P., E.E. A., is with the Signal Corps.

Bothwell, Robert H., E.E. A., is a First Lieutenant in the Chaplains' Corps.

Gorecki, Ferdinand, A. S. L., First Lieutenant in the Medical Corps, has reported for active duty at Selfridge Field, Michigan, according to a news release from Air Base Headquarters, Public Relations Office, Selfridge Field, Michigan.

Moseley, Raymond E., E.E. A., an Ensign with the United States Navy, is stationed at a Naval Pre-Flight School.

Ragan, Alvin J., Ch.E. A., is serving as an Ensign with the United States Navy.

Rodriguez, Carlos D., Ch.E. A., according to a recent letter from an alumnus, has purchased his own home and is living at Paseo de la Reforma 2581, Lomas de Chapultepec, Mexico, D.F., Mexico.

1937

Anderson, Fred R., F.P.E. A., writes that on February 1st of this year he became associated with the National Fire Group, 175 West Jackson Boulevard, Chicago, Illinois. His home address is 3700 Bosworth Avenue, Chicago.

Becker, Robert W., Arch. A., is employed as experimental engineer for the Curtiss-Wright Corporation, Plant No 2, Buffalo, New York, and lives at 351 Lincoln Parkway, Buffalo.

Difresne, Caryl A., C.E. L., who is a First Lieutenant, may be reached at 1st Quartermaster Battalion, A.P.O. 1209, c/o Postmaster, New York City, New York.

Jost, Frederick H., F.P.E. A., is a Corporal in Co. A, 2nd Engineer School Regt.

Lewis, Homer R., A.S. L., is a Major, 18th Field Artillery.

Ross, Herman M., C.E. A., in a letter to the alumni office, under date of September 1, 1942, wrote as follows:

Dear Sir:

This letter may come to you as somewhat of a surprise. A year ago today I couldn't see myself in the army, but several months ago—watching the progress of the war—I began to wonder whether I was entitled to the things I had—a fine family, nice home, a good job, the freedom to do and think as I pleased—without being willing to do my share to protect those precious things which I had come to expect. . . Well, to make a long story short, I applied for service with the army in that branch where I felt my education and experience could be best used. As a result I was commissioned a First Lieutenant, Sanitary Corps, Army of the United States.

Most of the officers and enlisted men I have met are looking forward to active overseas duty. Army morale as I have seen it is excellent.

I feel pretty proud to be a part of this and pretty confident that there isn't anything or anyone that can lick us.

Here's to a short war and a merry one!

Sincerely,

(Signed) 1st Lt. Herman M. Ross,
715th Medical Sanitary Co.

Sullivan, Frank E., A.S. L., recently was promoted to the rank of Major. He is now Commanding Officer of the 860th School Squadron, Army Air Force.

Wolff, Charles E., A.S. L., a Private, may be reached at Classification Section, Headquarters Company, 1610th Corps Area Service Unit, Camp Grant, Illinois.

Wright, Robert W., E.E. A., writes that he is a test equipment engineer for R.C.A. Manufacturing Company, Incorporated, 501 North LaSalle Street, Indianapolis, Indiana. His mailing address is 629 North Tacoma Street, Indianapolis. He would be glad to hear from or see any of the Electricals who may care to write or are passing through Indianapolis.

Zalewski, Harry, E.E. A., who is a Chief Petty Officer (CEM), may be reached at Construction Naval Unit, APO 502, c/o Postmaster, San Francisco, California.

1938

Horwich, Daniel, M.E. A., is a Second Lieutenant in the Engineer Amphibian Command.

Miller, James H., M.E. A., has recently become a member of the technical staff of the Bell Telephone Laboratories at Whippany, New Jersey. His address for mail is 25 Morris Avenue, Morristown, New Jersey.

Quayle, Vincent H., E.E. A., who is a Second Lieutenant in the Signal Corps, may be reached at Building 541, Room 26, Fort Monmouth, Red Bank, New Jersey.

1939

Bitter, B. J., M.E. L., sent the following letter to the alumni office:

Dear Sir:

. . . Please change my mailing address of the "Engineer and Alumnus" to 1 Oceanic Avenue, Staten Island, New York.

I am happy to say that a boy arrived in the family on July 4th. Mother and boy are doing nicely. In the vernacular of where I am stationed it is:

Launched: "PT" Bitter, Jr., July 4, 1942
Displacement: 5 lbs. 11¾ ounces
Length, forward to after perpendicular: 19 inches

The latest communique is that the baby is very seaworthy and mother steering a steady course.

Sincerely,

(Signed) B. J. Bitter, Lt. (JG).

Burg, Irving X., M.E. A., an Aviation Cadet, Aviation Cadet Detachment, Class 42-4 N.B.H. 301, Chanute Field, Rantoul, Illinois, recently wrote the alumni office as follows:

Dear Sir:

. . . Expect my commission in September. There are two others here with me. Harold E. Stehman, E.E. A'38, and Samuel O. Falk, Ch.E. I'41.

Sincerely yours,

(Signed) A/C Irving X. Burg.

Fridstein, Robert B., M.E. A., is a Lieutenant in the 55th Service Squadron—41st Service Group.

Johnson, Donald L., A.E., according to a recent news release from Public Relations Office, Lubbock Army Flying School, Lubbock, Texas, is now a Second Lieutenant in the United States Army Air Force. He received his commission on August 5, 1942.

Neubauer, Fred W., C.E. A., who is a Master Sergeant, is in the 951st Engineers (Avn.).

Smietanka, Frank J., A.S. L., is a Sergeant Major of the 808th Tank Destroyer Battalion.

Spengler, John A., Ch.E. A., is an Ensign in the United States Naval Reserve.

1940

Barlick, Robert F., Ch.E. A., who is an Aviation Cadet, may be reached at Scott Field, Belleville, Illinois.

Basic, Ernest, E.E. A., according to a letter from his sister, Mrs. John D. Johnson, is active in the Electronics Specialist Observer Corps with the R.A.F., and is attached to the American Embassy in London, England. Her letter reads as follows:

Dear Sir:

In reply to your letter of June 27th, regarding your request for a picture of Lieutenant Ernest Basic I am enclosing herewith copy of same.

My brother is active in the Electronics Specialist Observers Corps with the R.A.F. and is attached to the American Embassy in London, England.

He recently graduated with honors from the leading military academy in England, where he took special courses in Commander Observing. He is now slated for a high post, but will still be attached to the American Embassy at London.

You can reach my brother at the following address at all times:

Lieutenant Ernest Basic, Signal Corps
U. S. Army
c/o American Embassy
London, England

Thanking you for your interest, and awaiting a copy of the publication upon its distribution, I remain

Very truly yours,

(Signed) Mrs. John D. Johnson.

Bigos, Casimir L., Ch.E. A., is an Ensign in the United States Naval Reserve, assigned to the Navy Ordnance Bureau.

Bleaden, Sidney, E.E. A., is an Aviation Cadet and may be reached at Aviation Cadet Detachment, Class 42-4 N.B., Chanute Field, Illinois.

Collins, Walter S., M.E. A., is a First Lieutenant with a Tow Target Detachment.

GETTING "SOFT" ... EH?

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

"BEWARE of an America aroused!"

Sure we've been rolling on rubber—eating our sirloin steaks—lolling in the luxuries which only free Americans have the God-given genius to create, and the capacity to enjoy. But we can still take it, and we can still dish it out.

The world knows now that this "love of luxury" is just a thin outer garment, easily whipped off in an emergency—and that, underneath it, there are muscles of steel.

Sacrifice? We will sacrifice anything but our Liberty!

Suffering? We still remember about Valley Forge, and the blood of our fathers on the snow!

Death? Better death, any day, than life without freedom!

So they said we'd rather lose a war than lose an election? And those cracks, dividing us, were deep craters—not just surface scratches? Management wouldn't work with men, and men wouldn't work with management? And we couldn't get going *fast enough* to become a real factor in this war?

What a jolt the Axis is in for! You might just as well try to sweep the tide back with a broom as try to buck American machines, driven by free, skilled American workers.

◆ ◆ ◆

Inspired by the job our own workers are doing, we view this crisis, not with alarm—but with confidence. Every lathe, every drill, every tool in our plants has been turned into a weapon of war—every worker, man or woman, into a PRODUCTIONEER—a soldier in overalls. Such spirit, such skill, such strength cannot lose—for these men and women are fighting *with their hearts,* as well as with their heads and their hands—fighting, along with the millions of other patriotic workers throughout all America—to STAY FREE!

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THE LEADING MANUFACTURER OF EQUIPMENT FOR HANDLING MATERIALS AND TRANSMITTING POWER

Reprints in 4 colors furnished on request. Address: 307 N. Michigan Ave. Chicago. 8900A

Dahl, Walter L., F.P.E. A., formerly stationed at Jefferson Barracks, Missouri, wrote the following letter to the alumni office.

Dear Sir:

. . . At present I am a member of the 47th School Squadron located at Randolph Field, Texas. I have been assigned to the radio section of the squadron and at present am trying to master the various types of radios installed in Uncle Sam's training planes.

Yours truly,
Prvt. Walter L. Dahl
47th School Squadron
Randolph Field, Texas.

Dolder, Wayne, E.E. A., is in the United States Army.

Eisenberg, Joseph, A.E., 5th Technician, Engineers 36046565, A.P.O. 815, c/o the Postmaster, New York, New York, writes:

Dear Sir:

Please send me the Armour Alumnus magazine or its successor and such information as is available and of interest to a member of the armed forces.

Sincerely yours,
5th Tech. Joseph Eisenberg.

Elgenson, Leonard, C.E. A., who is a Second Lieutenant and Engineering Officer in the Army Air Corps is now serving in the foreign service division.

Fahey, James M., Ch.E. A., has been promoted from Second Lieutenant to First Lieutenant according to a news release from Air Base Headquarters, Public Relations Office, Selfridge Field, Michigan, which read as follows:

Selfridge Field, Michigan, July 21, 1942, First Lieutenant James M. Fahey, Army Air Corps, of 6409 Drexel Avenue, Chicago, Illinois, has been promoted from Second Lieutenant to his present grade. From October 1940 to December 1941, Lieutenant Fahey was an Aviation Cadet at the University of Chicago and Selfridge Field, Michigan.

At the present time he is the Weather Officer at Selfridge Field. He reported at Selfridge Field March 1, 1942.

First, Joseph J., Ch.E. A., resides at 631 Adams Street, Gary, Indiana.

Forsberg, Carl O., Ch.E. A., resides at 191 Anderson Place, Buffalo, New York.

Foster, Robert J. Ch.E. A., now resides at 310 North Elmwod, Peoria, Illinois, and is employed by Northern Regional Research Laboratory, Peoria.

Green, George F., A.S. L., is an Aviation Cadet.

Gromiack, Theodore, M.E. A., is employed at Rock Island Arsenal, Rock Island, Illinois. His home address is 173—15th Avenue, Moline, Illinois.

Miller, Chester E., A. S. L., is a Corporal in the Medical Detachment of the 36th Armored Infantry Regiment.

Miller, Frank, Ch.E. A., is a Lieutenant, 337th School Squadron.

Oldenburg, Kenneth, E.E. A., is a Sergeant and may be reached at Machine Records Unit, United States Army, APO 887, New York City, New York.

Patlogan, Louis, Ch.E. A., who is an Aviation Cadet, may be reached at Cadet Detachment 42-6, Chanute Field, Illinois.

Piegzik, John A. J., A.S. L., is a Second Lieutenant at Headquarters, 5th Infantry.

Vogt, Frank J., M.E. I., is an Ensign stationed at Washington, D. C., working in the Engineering Procurement Section. His home address is 4420 West Lake Street, Chicago, Illinois.

Wagner, Ralph H., M.E. A., is now an Ensign in the United States Navy, and is stationed at the U. S. Naval Engineering Experiment Station, Annapolis, Maryland. His residence address is Barry & Bancroft Avenues, Bay Ridge, Annapolis, Maryland.

Wessels, Delano E., Ch.E. A., is a Lieutenant in the Army Air Corps and is now serving in the foreign service division.

1941

Anderson, Guveren M., M.E. I., is a Lieutenant and Squadron Engineering Officer, Army Air Corps.

Beckmann, Paul G., M.E. I., is an Aviation Cadet and may be reached at Aviation Cadet Detachment, Class 42-4, Chanute Field, Illinois.

Bebb, Dale M., E.E. I., who is a Lieutenant in the Army Signal Corps, may be reached at Kruft Laboratory, Harvard University, Cambridge, Massachusetts.

Dietch, William A., A.S. L., who fought in the Java battle, is now stationed in Australia. His new address is: Lieutenant William A. Dietch, 0-433137, 30th Squadron, 19th Bomber Group, A.P.O. 922, c/o Postmaster, San Francisco, California.

Johnson, Wallace A., M.E. I., recently wrote the following letter to the alumni office.

Dear Sir:

At present, the enclosed check represents my capacity for donation. I am 100% for your plan and from time to time I shall remember the alumni fund. I read with interest all alumni news and for this reason would wish the alumni office to please note my new address.

Yours very truly,
Wallace A. Johnson
995 Caledonia Avenue
Cleveland Heights, Ohio.

Mahn, George R., F.P.E. I., who is a student engineer with the General Electric Company, 1 River Road, Schenectady, New York, writes that Jack Clark, M.E. A.'40, Lionel Naum, E.E. I.'41, Frank Slavin, F.P.E. A.'40, Steve Finnegan, F.P.E. A.'39 and Richard Larson, F.P.E. A.'41 are employed in General Electric plants in the east. Mr. Mahn's home address is 7612 South Damen Avenue, Chicago, Illinois.

Murray, Bud, C.E. I., is with the Bureau of Yards and Docks, Navy Department, Washington, D. C., according to a letter from an alumnus also stationed in Washington, D. C.

Pointek, Eugene C., A. I., is stationed at Balboa, in the Panama Canal Zone, according to a letter receeived from his father. The letter dated May 17, 1942, reads as follows:

Dear Sir:

Please be advised that Eugene Pointek is now and has been for the last 8 months with the Panama Canal Authorities and is stationed at Balboa, in the Panama Canal Zone, where he is employed as an architect and engineer. I should have mentioned that Uncle Sam is his employer.

For the information of his class-mates and alumni, who perhaps would be interested in writing to him, the address is as given above and in addition his box number should be given which is 1368. As his father I am positive that he would be very happy to hear from his former buddies. It's a lonely place so write in and cheer him up.

Yours very truly,
(Signed) Clement Piontek.

P. S.: Disregard difference in the spelling of the name. Pointek is the way he uses it and has adopted it.

Sauvage, John F., M.E. I., has been promoted to a Lieulenant (j.g.) according to a letter receeived by the alumni office. Lieutenant Sauvage is stationed at the Naval Training School, Navy Pier, Chicago, Illinois.

Schmidt, Robert F., M.E. I., is now an Ensign in the United States Naval Reserve. His new address is Ensign Robert F. Schmidt, E-V (S), U.S.N.R., 66 Park Avenue, Murray Hotel, Apt. 11C, New York City, New York.

Segner, John, Ch.E. I., is a Lieutenant, 30th Observation Squadron.

Wright, Arthur E., A.S. I., and Mrs. Wright recently announced the arrival of their daughter, Carolyn Joan, who was born July 24, 1942.

1942

Allen, Howard, Jr., Ch.E. I., is an Ensign in the United States Navy.

Brouk, Robert R., A.S. L., recently returned to his home in Cicero, Illinois, to be honored by the entire community. Ten thousand persons marched in a parade honoring Brouk, who is a Flight Commander hero of the "Flying Tigers," and who recently returned from Burma.

Carr, John O., M.E. I., who is a Staff Sergeant, may be reached at Hq. Squadron, 6th Air Depot Group, c/o Postmaster A.P.O. 938, Seattle, Washington.

Cech, Elmer C., A.S. L., who is a Cadet, U. S. Navy Pre-Flight School, Iowa City, Iowa, writes as follows:

Dear Sir:

I have just about completed the three month's preliminary course here. This pre-flight school at Iowa University, together with three other similar schools in other universities throughout the country, are physically and mentally conditioning thousands of Cadets who eventually are going to be commissioned as the best trained and toughest Navy fliers this world has ever seen. On the 22nd of this month I am being transferred to the U. S. Naval Reserve Aviation Base at St. Louis, Missouri. I will send you my new address from there.

Thank you for your interest, and I would appreciate receiving any alumni publications and news that you could send to me at my new base.

Yours truly,
(Signed) Elmer C. Cech.

Cibira, Stephen, M.E. I., is a Corporal, in Company G, 3 C.W.S. Trng. Bn.

DeBoo, Emil A., M.E. I., an Ensign in the United States Naval Reserve, has recently been transferred from Pasadena, California to San Diego, California. His new address is Junior Officer's Quarters, Naval Air Station, San Diego, California.

Golden, Gerald, Ch.E. I., is an Ensign in the United States Navy.

Jencius, Frank J., M.E. I., is an Ensign in the United States Navy. He is stationed at the M.I.T. Dormitory, Cambridge, Massachusetts.

Kamins, Alvin, M.E. I., in a letter under date of July 14, 1942, said:

Dear Sir:

In answer to your letter, I am sending you a picture of myself in uniform. In this Cadet Detachment there are four other recent graduates of Illinois Institute of Technology and one Armour Institute graduate, that I know of. There is also one former senior, not a graduate. The Illinois Tech Graduates are: George Post, M.E. I. '42, Bennett Edelman, M.E. I .'42, Robert Novosad, Ch.E. I. '42, and Paul Mayer, Ch.E. I. '42. The Armour Graduate is Arthur G. Hansen, M.E. A. '40. The senior is Sherman Simon, class of June '42.

Sincerely,
Aviation Cadet Alvin Kamins
Eng. Av. Cadet Detachment
Class 42-5
Chanute Field, Illinois.

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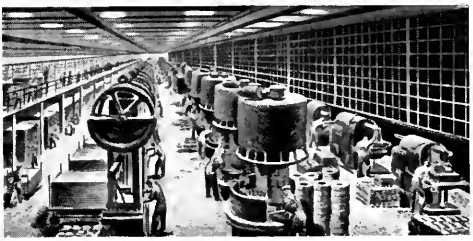
VENTILATION 100%



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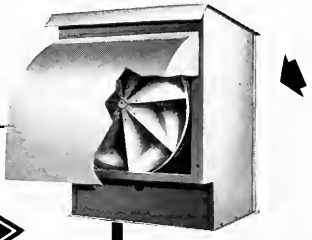

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Lasco, Henry A., E.E. I., who is an Aviation Cadet, may be reached at the Cal-Aero Academy, Ontario, California.

Loftus, Edson G., M.E. I., is a Lieutenant (j.g.), at a U. S. Naval Air Station.

Mays, John J., Ch.E. I., is in the Army Air Corps and may be reached at 194th Chemical Platoon, 6th Air Depot, Postmaster A.P.O. 938, Seattle, Washington.

Newell, Jack W., C.E. I., son of B. Newell, 4111 Ivy Street, East Chicago, Indiana, is now working on the production of Curtiss Helldiver dive bombers and Seagull Scouting planes for the U. S. Navy in the engineering department of the Columbus, Ohio, plant of the Curtiss-Wright Corp.

Streit, Clarence T., M.E. I., is an Ensign in the United States Naval Reserve. He may be reached at the United States Naval Academy Post-Graduate School, Annapolis, Maryland.

Wolaver, Edwin J., F.P.E. I., is an Ensign in the United States Naval Reserve.

1944

Miller, Charles H., M.E. I., who is a Second Lieutenant, is in the United States Army Air Force, Lubbock Army Flying School, Lubbock, Texas.

MARRIAGES

1940

Maxwell, Robert B., F.P.E. A., was married on Sunday, June 28, 1942, to Martha Hirt in The North Shore Christian Church, Chicago, Illinois.

1941

Lange, Robert H., F.P.E. I., was married on Friday, June 19, 1942, to Jean Davidson of Honston, Texas.

Reimer, Gerhard M., M.E. I., was married on Saturday, August 15, 1942, to Myrtle Minnie Kohr in the Grace Evangelical Lutheran Church, Sixty-First and South Marshfield Avenue, Chicago, Illinois.

Snodgras, Lillian A., A.S. I., became the bride of Alexander T. Reynolds, M.E. I., on Thursday, August 13, 1942, at Austin Methodist Episcopal Church, Central and Race Avenues, Chicago, Illinois.

OBITUARY

1900

Taylor, Graham R., A.S. L., formerly of New York City, passed away on August 30, 1942. He had spent many years in civic work and had been associated with the Commonwealth Fund in New York for the last twenty years. Mr. Taylor is survived by his widow, a son, a daughter, and two sisters, the latter Miss Lea Demarest Taylor, Ac. L. '00, head resident of Chicago Commons, and Katharine Taylor, director of Shady Hill School, Cambridge, Massachusetts.

1913

Yorke, William Howard, M.E. A., formerly of 8215 S. Ingleside Avenue, Chicago, Illinois, passed away July 19, 1942.

1915

Marx, Emmett R., C.E. A., passed away at Tucson, Arizona, late in August, 1942.

1941

Blume, Arnold, Arch. A., formerly of 1295 Des Plaines Avenue, Des Plaines, Illinois, was killed in an aviation accident in Hawaii on July 19, 1942.

Umbright, Warren T., F.P.E. A., was killed in an airplane crash near Ann Arbor, Michigan, on September 11, 1942. Ensign Umbright was stationed at a Naval Airport at Grosse Ile, Michigan, where he had been giving flying instructions to cadets of the Royal Air Force.

PHYSICS

(From page 10)

and Julia Shackelford; Journal of Chemical Physics, 8, 153-156 (1940).

3. *Infra-Red Absorption Spectrum of Methylphenylacetylene*, M. J. Murray, F. F Cleveland; ournal of Chemical Physics, 8, 133-134 (1940).

4. *A Simple Device for Rapid Production of Photographic Copies*, F. F. Cleveland, American Journal of Physics, 8, 261 (1940).

5. *Raman Spectra of Acetylenes. III. Five Monosubstituted and Four Disubstituted Acetylenes*, F. F. Cleveland, M. J. Murray; Journal of the American Chemical Society, 62, 3185-3188 (1940).

6. *Raman Spectrum of 1-Bromo-Dodecane*, F. F. Cleveland, M. J. Murray; Journal of Chemical Physics, 8, 867-868 (1940).

7. *Raman Spectra of Some Ethers Containing One or More Phenyl Groups*, M. J. Murray, F. F. Cleveland; Journal of Chemical Physics, 9, 129-132 (1941).

8. *Raman Spectrum of an Aqueous Solution of Potassium Cyonate*, F. F. Cleveland; Journal of the American Chemical Society, 63, 622-623 (1941).

9. *Atmospheric Oxidation of 6-Dodecyne*, M. J. Murray, F. F. Cleveland; Journal of the American Chemical Society, 63, 1363-1364 (1941).

10. *Raman Spectra of Acetylenes. IV. Carbon Isotope Effect in Acetylenes*, F. F. Cleveland, M. J. Murray; Journal of Chemical Physics, 9, 390-392 (1941).

11. *Raman Spectra of Acetylenes. V. Alkyl Acetylenes*, M. J. Murray, F. F. Cleveland; Journal of the American Chemical Society, 63, 1718-1721 (1941).

12. *Raman Spectrum of Di-Tertiary-Butyl Ether*, F. F. Cleveland; Journal of Chemical Physics, 9, 722-724 (1941).

13. *Raman Spectra Evidence for Hindrance of Resonance by Ortho Substitution*, Robert H. Saunders, M. J. Murray and F. F. Cleveland; Journal of the American Chemical Society, Cleveland, Robert H. Saunders and M. J. Murray; Journal of the American Chemical Society, 63, 3121-3123 (1941).

14. *Effect of Silver Ion Coordination upon the Raman Spectra of Some Unsaturated Compounds*, Harvey J. Taufen, M. J. Murray and F. F. Cleveland; Journal of the American Chemical Society, 63, 3500-3503 (1941).

15. *Raman Spectra of Some Aliphatic Ketones*, F. F. Cleveland, M. J. Murray, J. R. Coley and V. I. Komarewsky; Journal of Chemical Physics, 10, 18-21 (1942).

16. *Raman Spectra of Acetylenes. VI. 1-Butyne, 1-Pentyne, 1-Hexyne, 3-Hexyne, 4-Octyne and 1-Chloro-1-Heptyne*, F. F. Cleveland, M. J. Murray and H. J. Taufen; Journal of Chemical Physics, 10, 172-176 (1942).

17. *Raman Spectra of Some Aromatic Carbonyl and Nitro Compounds*, M. J. Murray, F. F. Cleveland and Robert H. Saunders; Journal of the American Chemical Society, 64, 1181-1184 (1942).

18. *Association Effects in the Raman Spectra of Thiophenol in Donar Solvents*, Robert H. Saunders, M. J. Murray and F. F. Cleveland; Journal of the American Chemical Society, 64, 1230-1231 (1942).

HOME ECONOMISTS

(From page 18)

United States Department of Agriculture, but there is also an increasing demand for teachers of adult gronps of home makers in connection with other public and private agencies.

Dietetics

Next to teaching, the field of hospital dietetics probably claims the largest number of Home Economics graduates. The hospital dietitian may either have the full administration of the food service of the hospital or, in a large institution, may confine herself to the planning and preparation of special diets and to teaching patients how to carry out in their own homes the doctor's dietary instructions. Closely allied with the work of the hospital dietitian is that of the director of college and university cafeterias or dining halls, which frequently afford opportunity for practice for dietitians in training.

Public Health and Social Welfare

A relatively new but rapidly increasing field for Home Economics graduates is the work of the Home Economist or Nutritionist in a public health or social welfare organization. Many state health departments are now employing nutrition consultants under the broad health provisions of the Social Security Act, and Home Economists are being employed in many of the government programs such as those of the Farm Security and Farm Credit Administrations.

Business

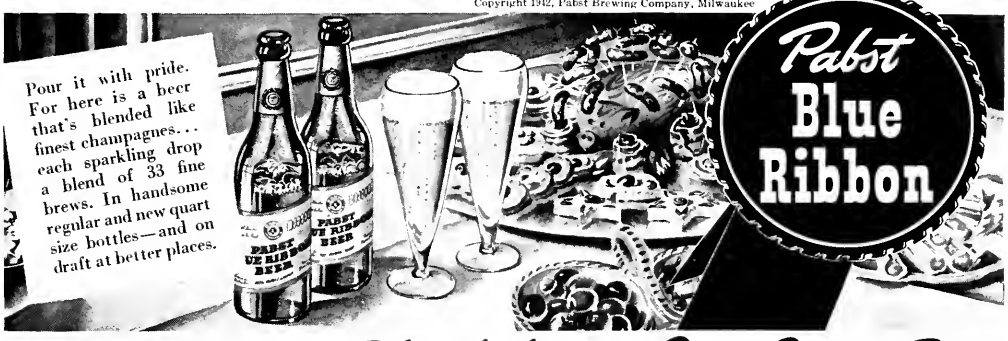
In business, the primary function of the Home Economist has been defined as two-fold: first, to determine and interpret to the manufacturer the needs of the consumer—in most instances the housewife, and second, to serve the consumer directly with complete information concerning the product or group of products. This may involve many different types of activity, including writing, lecturing, demonstrating, investigaton of the characteristics of a given product and its ability to meet consumer activities —in other words, research—and many other activities.

A recent survey (1940) of the peacetime activities of the Home Economies Women in Business group of the American Economics Association showed the following distribution of employment:

Advertising	11
Advertising promotion	2
Consultant	42
Equipment	26
Finance	5
Foods	186
General	45
Home Service	108
Hotels	10
Journalism—Magazines	46
Journalism—Newspapers	42
Radio	7
Restaurants and Tea Rooms	74
Textiles	10

From this survey it is apparent that thus far the great majority of opportunities for Home Economics trained women in business are found in some phase of commercial work in foods, including restaurant and tearoom management, with positions in the home service departments of the large utility companies a close second.

Other business fields which employ a fairly large number of Home Eco-



33 Fine Brews Blended into One Great Beer

nomists are those of journalism and household equipment. Up to now opportunities in textiles have been limited. However, the need for consumer education in textiles is great, and opportunities in this field may be expected to increase. Whatever her field, an analysis of the activities of the business Home Economist will show that practically every business position which she may hold involves teaching (adult education) and sales promotion. To quote from a recent publication of the Home Economics Women in Business Department of the American Home Economics Association: "even such positions as manager of a tearoom in a store or director of food service for a railroad or airline, or home budget advisor for a bank or finance company may well be included under sales promotion, for they are instituted to create an intelligent understanding of the product or service the business Home Economist represents, to build good will, and attract customers and clients by furnishing a superior type of service."

Whatever the job of the business Home Economist, it usually involves some writing. This may be the preparation of educational leaflets and booklets, or the preparation of newspaper and magazine articles and the like. Often the job involves the operating or directing of a test kitchen, with perhaps the management of a special company dining room on the side, and more frequently it involves lectures or demonstrations before school or club groups and radio interviews or talks.

HOME ECONOMICS RESEARCH

For those students who show a special aptitude for work in the fundamental sciences, either physical, social, or biological, and who are imbued with scientific curiosity as well as the desire for creative work, Home Economics research offers fascinating and professionally rewarding opportunities. While some commercial firms in both the food and textile industries employ Home Economists engaged in various types of research, the majority of such positions are found in connection with the large colleges and universities, either in the Home Economics Department itself or in connection with the State agricultural experiment stations. The Bureau of Home Economics in Washington also employs a number of research workers in foods and nutrition, family relationships and textiles and clothing. For positions of this nature graduate work is usually necessary—at least the master's degree and often the Ph.D.

THE HOME ECONOMICS CURRICULUM AT ILLINOIS INSTITUTE OF TECHNOLOGY

The Home Economics Department at Illinois Institute of Technology has attempted to set up a curriculum which will afford a sound basic training in Home Economics and also permit specialization in the field of the student's special interest. Courses of study which conform to the special requirements of professional organizations such as the American Dietetics Association and the American Home Economics Association also have been arranged. Basic training is provided in English and in the physical and biological sciences as well as the social sciences and related arts. Training in the physical sciences includes courses in physics and in general and organic chemistry, with physiological and food or textile chemistry required in certain sequences. Training in the biological sciences includes courses in human physiology and in bacteriology. For a degree in Home Economists enough work is required in foods, clothing, home management and child care, and economic and social problems of the family to provide a working knowledge and a sympathetic understanding of each of these fields.

THE EFFECT OF THE WAR ON OPPORTUNITIES IN HOME ECONOMICS.

One would be brave indeed to attempt to predict the effect of the war on Home Economists at this stage of is development. The government has issued an urgent call for staff dietitians in army hospitals and there is a scarcity of persons in this field. As the war advances and shortages of the familiar consumer goods become more severe, Home Economists will be needed to help in the interpretation of government programs to the consumer and in the adjustments which the housewife must make to the changing war economy. Some commercial firms are discontinuing their Home Economics departments, but many others are maintaining them intact, using the resources of these departments in carrying on classes in nutrition, conducting food demonstrations, preparing exhibits, and giving valuable assistance in the maintenance of civilian morale. It is to be expected that opportunities in this field will increase rather than decrease as a result of the war activity.

WAR TRAINING

(From page 22)

headquarters in Chicago. After conferences with the officers of this division, a six-weeks, 48-hour per week training course has been developed in which carefully selected men with a background in Industrial Safety, Explosives, Fire Protection, or Chemistry are given training in the duties of this branch of the War Department. Professor Finnegan, with his long experience in Fire Protection Engineering, was of the greatest assistance in planning this course, and Underwriters' Laboratories have cooperated by supplying instructors and laboratory facilities. The highlight of this training course is the trip to the Lemont Testing Station, where A. H. Nuckolls of Underwriters' Laboratories demonstrates to the students the peculiar behavior of explosives. A number of Institute alumni have joined this highly important service, including F. R. Anderson, F.P.E. '37; B. F. Flood, F.P.E. '41; J. E. Harrington, Ch.E. '26; J. R. Lossman, F.P.E. '30; M. E. Luber, Ch.E. '38, F.P.E. '40; J. H. Markham, Ch.E. '19; H. F. Perlet, F.P.E. '28; C. M. Westerman, F.P.E. '31; and R. E. Winkler, F.P.E. '37. It appears that training in this field will continue indefinitely, with employees of the Explosives Safety Branch and representatives of the explosives plants in attendance. It is also expected that women will be trained in this field, although the number of qualified women applicants for such exacting positions is necessarily small.

One of the most useful activities during the past year has been the training of Naval Material Inspectors who are recruited from the 4F draft classification. These young men are given a co-operative course, during which they spend half of their working days at the Institute and half in the plants of Naval contractors. Thus, two trainees hold down one job, and the work is done while they are going to school. By this program, more than one hundred young men have been enabled to fight the war on the home front, despite physical handicaps which keep them away from the battle front.

Statistics are usually very dull, and accordingly this report has presented a bare minimum. It is appropriate to state that the total enrollment in war training classes to date is well past 20,000, and, during the coming year, this number will probably be doubled. During the second year of operation under the Engineering, Science, and Management Defense Training, the total number of trainees was 11,337, out of a national total of 423,115. The Institute has spent approximately $492,888 out of a national total of $19,288,616. That is,

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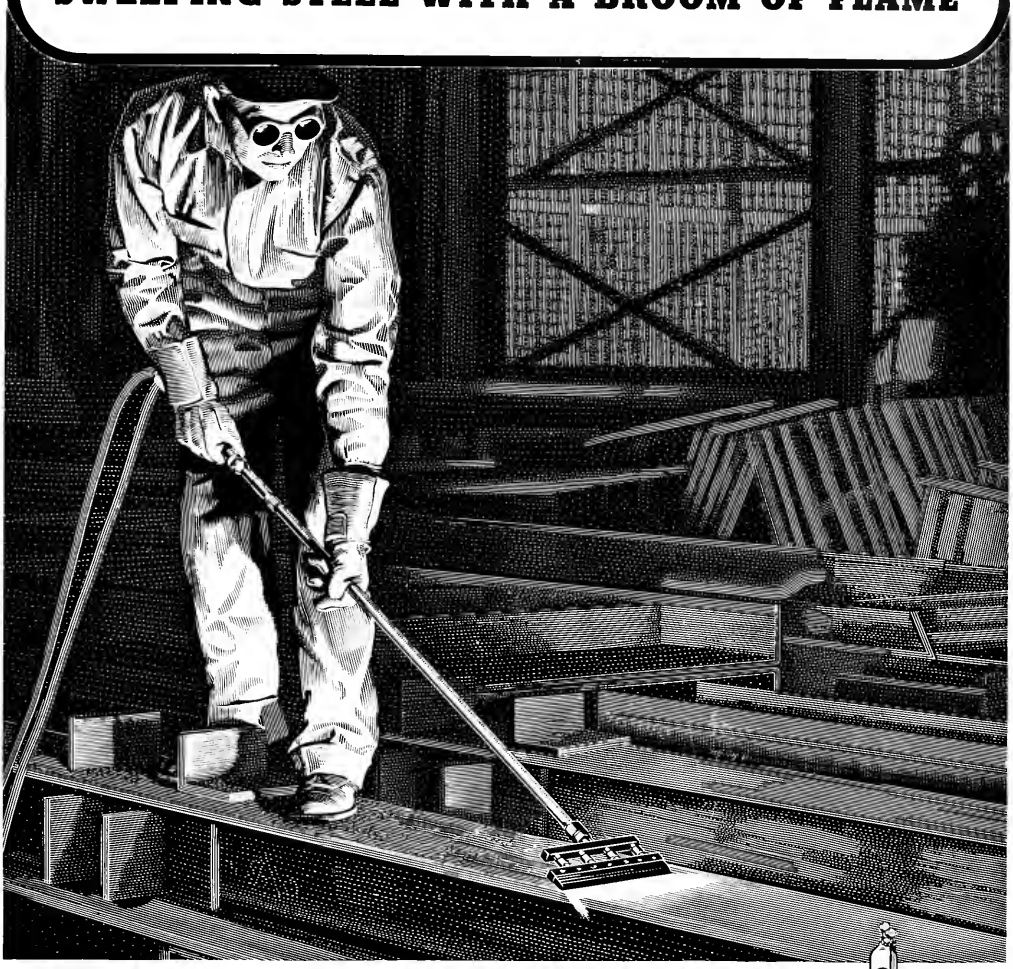

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on a basis of enrollees, we have done 2.7 per cent of the training for 2.6 per cent of the national cost. If the enrollments were properly weighted for full-time courses, it would appear that the cost figure would be somewhat more favorable, since much of the Institute's program consisted of 40-hour per week, 10-week courses.

The War Training Committee intends to continue full participation in the Engineering, Science, and Management War Training Program for the duration. It is our intention to meet every industrial training need which may be presented, as well as the needs of the various government services. A large but efficient administrative organization has been set up, and new training programs in virtually any technical field can be established whenever there is a clearly demonstrated need. The assistance of the alumni and other friends of the Institute who have served as instructors or supervisors is deeply appreciated, and the Committee is fully aware of the fact that without this excellent co-operation very little could have been accomplished. To those alumni who are in executive capacities in Chicago's industries, may we say that the war training facilities of the Institute are at your disposal. Make use of them.

JOHN I. YELLOTT.

RADIO

(From page 23)

Most impressive phase of the work in terms of numbers is the study in "elementary radio engineering," which precedes the micro-waves courses. More than 500 men took this training during the summer months, and at least three times that number are scheduled to be in training continuously for the duration.

The most capable men in these classes are moved into the ultra-high-frequency work, while the rest enter active service immediately.

A third full-time training program is the radio operators' and code school, which opened in September. The Institute conducts this program in the old building of the Northern Illinois School of Optometry, Forty-third Place and Drexel Avenue. The building provides classroom and laboratory facilities for several hundred men.

Like the more advanced courses, this program will be continuous for the duration, with a full quota of men beginning study as soon as a previous group finishes the work. These men, too, will be Signal Corps enlistees.

All these programs are full-time courses, forty-eight hours weekly for ten or twelve weeks. Entrance to the work may be secured only through the U. S. Signal Corps, as the Institute has no part in recruiting students.

This study is a full-time intensive job. Class and laboratory sessions take up eight hours daily. In addition, as Dr. Jesse E. Hobson, head of Illinois Tech's electrical engineering department and administrator of the program, told an elementary radio class last summer, "Home work takes many hours more. These men are working hard; they have few dates and they don't go swimming these hot days. There's a war going on, and, although they are far from the guns, they are right in the middle of the fight!"

Illinois Tech has also made this type of training obligatory for its electrical engineering seniors since Pearl Harbor. These men are required to study ultra-high-frequency techniques—work which in ordinary times would be considered advanced graduate work. Like the regular Signal Corps trainees, these engineers will be eligible for commissions when they graduate.

In addition to these full-time courses, elementary work at six different levels is offered in various evening classes. A total of 267 persons took these courses during the summer, most of them preparing to enter more advanced study as Signal Corps trainees.

The phenomenal growth of this technical training program becomes especially significant in view of the fact that it is a new type of work, developed almost entirely since the Signal Corps began its expansion program. All the courses of study had to be planned and designed by Illinois Tech faculty members, under the direction of Dr. Hobson, a young electrical engineer who finished his own graduate work only a few years ago; never before had ultra-high frequencies and the necessary prerequisite work been a part of the standard electrical engineering curriculum.

Laboratory equipment, too, had to be designed and built largely by Illinois Tech engineers, since many of the facilities needed were too new in principle to be manufactured by standard electrical companies. The story of the building of the electronics laboratories is in itself a story of pioneer work. At least $100,000 went into the laboratory equipment, which includes some facilities available at only a few places in the country. One of the laboratories is housed in a building constructed for mechanics' training during the first World War, reclaimed for this new war job. Apparatus built at Illinois Tech includes numerous wave-guide facilities, designed especially for use with the micro-waves; wire systems for the measurement of wave lengths; coupling and tuning units and numerous complex types of tubes. Most of the equipment consists of new adaptations of older principles, modified by Illinois Tech engineers for use with ultra-high frequencies.

Also included in the laboratory equipment are the complete facilities of the old RCA Institute in Chicago, purchased by the Institute last spring and now set up with other equipment to form one of the most complete electronics laboratories anywhere. The RCA facilities include some of the finest equipment available for work in radio, electronics, Morse code and television, direction finders and thirteen standard transmitters ranging from tiny fifteen-watt stations to the largest commercial types. Much of the equipment, especially the items mentioned above, is at present rarely found in the laboratories of educational institutions. It has been gathered over a period of years from the vast resources of the RCA organization.

This huge program literally makes Illinois Tech the electrical war-training headquarters of the Midwest. One of the largest group of trainees at any school in the nation, plus the unique quality of equipment and training, make the whole program a vital factor in the war effort.

The whole program is administered by the electrical engineering department of the Institute, under the direction of Dr. Hobson, to whose work the smooth operation of such a complex program is a tribute. Assisting him and Col. C. N. Sawyer, chief signal officer of the Sixth Service Command, is a committee consisting of Prof. P. G. Andres, Dr. C. S. Roys, Dr. W. A. Edson, Mr. L. T. Anderson, Mr. A. G. Mohaupt and Mr. E. H. Schultz. Instructors—mostly radio engineers recruited from private industry, as well as veteran electrical engineering instructors drawn from the regular faculties of Illinois Tech and other leading technological schools—number nearly one hundred, with a probability that more will be added as the various phases of the program continue to expand.

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The elevated water tank shown above, in use at Indianapolis, Ind., is a beautiful and functional structure. Resting on tubular steel columns, radial girders support the 1,500,000 gal. capacity tank. The tank has a radial-cone bottom, which has the shape a flexible container would have under similar conditions. One of the inner columns, used as the riser, is always full of water. Another, extending through the tank and above the water line, is used as an access tower, and has a ladder inside it. The radial-cone design allows a large quantity of water to be stored with a small depth, or "range in head", thus tending to keep the water pressure in the mains constant.

The all-welded tank, built by the Chicago Bridge and Iron Company, has a diameter of 96 ft. The water is 30 ft. deep, and the columns are 54 in. diameter by 92 ft. high. The girder ends, cantilevered for a distance of 9 ft., are tapered at the ends to conform with the lines of this landmark of beauty.

SABOTAGE

(From page 24)

double their efforts to safeguard the lives, limbs, and productiveness of the nation's workers, and particularly to concentrate on industries and areas vital to war production. As you already know, the Secretary of Labor, anticipating the acute accident problem which confronts us today, created a National Committee for the Conservation of Manpower in War Industries to devise a nation-wide system of distribution of safety knowledge, and to undertake a program of personalized door-to-door safety service.

Under this plan more than 450 carefully selected safety engineers, experts, and technicians, holding prominent positions in some of the country's largest and best-managed industries, are contributing a part of their time in calling upon war plants in their own industrial communities. They are talking to top executives, explaining the underlying causes of accidents, are helping to set up safety programs where they do not now exist, and are strengthening already going programs. They are making tours of war plants, giving the management specific recommendations for improvements where accident hazards are found to exist. They are cooperating with engineering colleges over the nation in the organization and conduct of more than 800 classes—similar to your own—with a total enrollment of key supervisory personnel from war industries that is well over 22,000.

If uninterrupted production is the first essential for victory, and if the facts of the present accident situation mean what they appear to mean, such a program is needed not merely as a means of protecting individuals from needless death and injury, not merely as a means of protecting business and industry from needless economic loss but as an integral part of the national war effort, as a contribution toward national strength, and the preservation of the ways of life that American soldiers are now giving their lives to defend.

However, the force which in the last analysis will crush our enemies—be they one or many—and thus safeguard the free institutions not only of the 130,000,000 of our fellow countrymen, but all that's left of democracy in the world will be our force of skilled workmen. Not one can we spare.

So tonight as you go forth, industrial soldiers who have completed this course, remember your very definite responsibility to your country and your fellow Americans. Be ever on the alert against any and all forms of unintentional sabotage!

BOOK SHELF

(From page 30)

must be considered in reaching a solution of these problems. He describes the remedial methods which have been attempted as solutions and presents the basic patterns for urban integration.

Chapter I begins with the arresting statement that there are in the United States seventeen sprawling metropolitan areas with populations of 750,000 or more. Without plan, these areas have resulted from suburban growth more rapid than central city growth, largely on account of improvements in transportation facilities. The reasons why citizens have moved from the city to the suburbs in one particular region are quite interesting, and probably the reasons would be found to be very similar in others. For the case cited, Cleveland, Ohio, the desire to live in a cleaner, healthier neighborhood and to own a home predominated as a cause of movement. Real estate promotion played its part in stimulating a suburban movement as well as in satisfying the desires of the population.

To residents of the Chicago area Professor Jones' enumeration of the multiplicity of governmental units in this area will probably be surprising, although most realize that some con-

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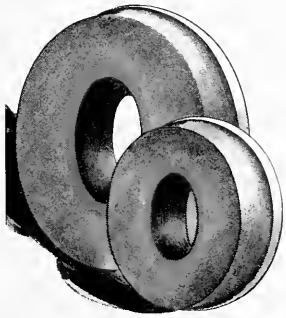

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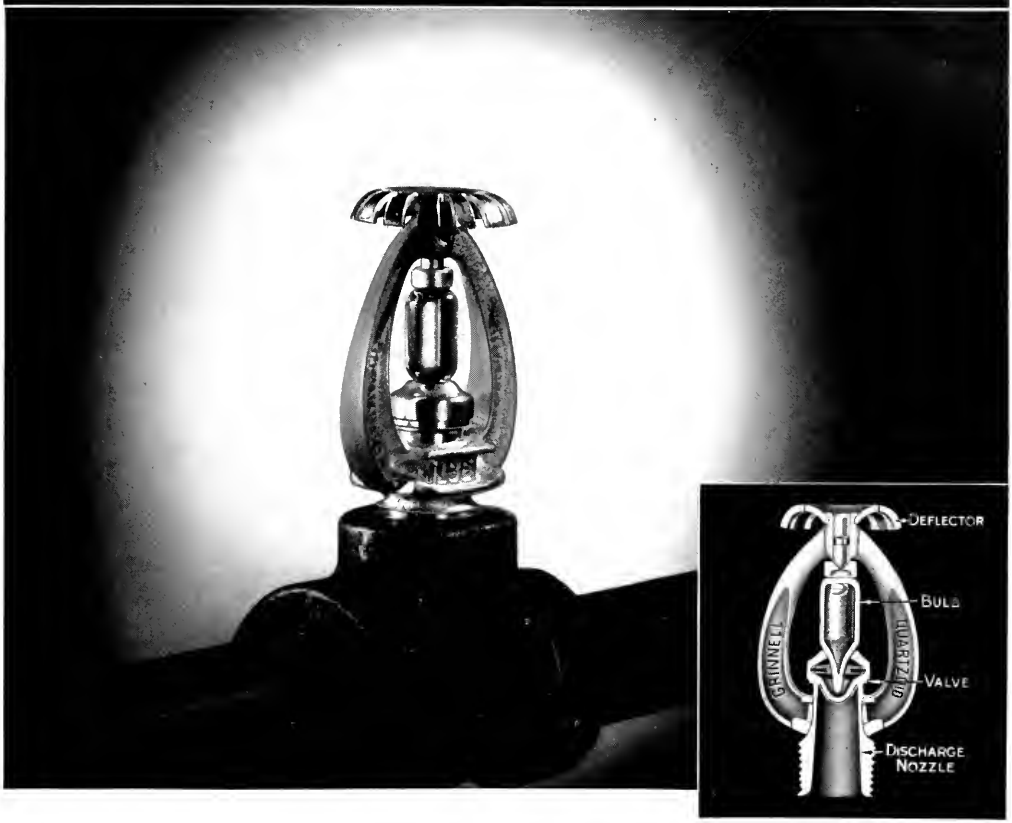
fusion does exist. As of 1938 he lists 358 separate governments in the Cook County portion of metropolitan Chicago: 89 cities and villages, 1 county, 30 townships, 195 school districts, 45 park districts, 1 forest preserve district, 4 sanitary districts, 2 mosquito-abatement districts, and 1 health district. Other metropolitan areas show similar conditions.

In his second chapter, Dr. Jones treats the rise of metropolitan communities in Europe and the United States and briefly describes some of the attempted solutions of the problem. Bulking largely in the list of problems is mass transportation, the very thing which made such widespread communities possible. The difficulties of achieving transit unification are indicated, together with problems of highway transport for the privately owned vehicle. Sanitation follows after transportation as the second most pressing metropolitan problem. Garbage collection and disposal, sewage treatment, harbor and stream pollution, water supply and distribution, and the public health all interlock into the especially complex sanitation puzzle for the larger areas. Localized police jurisdictions and their attendant faults in protecting the public form another one of the facets of the metropolitan problem. Protection

The little glass fireman that draws no pay...



TAKE a good look at this picture. For without a ladder you seldom get a close-up of a sprinkler head.

This one is said to be the last word—so reliable that industries which equip their buildings with this little "fireman" obtain low insurance rates. Users say it pays for itself.

When the heat of a fire reaches a certain temperature, the little "Quartzoid" bulb you see in the sprinkler head is shattered by expanding liquid inside it. A valve is thus released, and water is directed onto the fire.

For the engineer, there's more to that little bulb than meets the eye. For one thing, it replaces alloys formerly used. For another, it shows how glass can now be made into accurate mechanical parts. The bulb must shatter at a specific temperature. And it must shatter completely, with no splinters to hinder valve action. Too, it must fit its hardware exactly. So it's up to Corning to supply glass free from weakening flaws and to hold wall thickness and O.D. to the small tolerances that can make or break the efficiency of a sprinkler head.

Fussy? Sure. But fussy and tough jobs are stock in trade at Corning. Did you know for instance that Corning makes a light globe that also protects industry because, unlike the "Quartzoid" bulb, it will *not* shatter? That Corning has developed industrial glasses to withstand heat that turns metals to liquid? Or that glass springs from Corning will outlast metals in fatigue tests?

These few examples give you an inkling of the growing usefulness of glass in these days of material shortages. No wonder engineers with urgent problems say "Ask Corning." Corning Glass Works, Corning, N. Y.

CORNING
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Research in Glass

against fire is stated by Dr. Jones to be not quite so pressing as police protection. The chapter on the total metropolitan problem closes with a discussion of taxation difficulties due to a multiplicity of governmental and public service units with overlapping areas.

In treating solutions the author has broken them into two divisions according to whether they do or do not involve structural changes in existing local governmental units. Methods involving few if any structural changes are: "(1) the grant of jurisdiction to, and the provision of services by, the central city outside its boundaries; (2) the establishment of *ad hoc* authorities; (3) intergovernmental arrangements; (4) the extension of state administration; and (5) the extension of federal administration." Dr. Jones feels that the methods requiring structural changes offer greater promise for effectiveness and he lists them as: "(1) the annexation of contiguous territory or the consolidation of adjacent municipalities; (2) city-county consolidation and separation; (3) the merger of special authorities with either the central city or county; (4) the reorganization of the urban county and the transfer to it of metropolis-wide municipal functions; (5) the establishment of a 'federated' municipal government for the metropolitan area; and (6) the creation of a metropolitan city-state."

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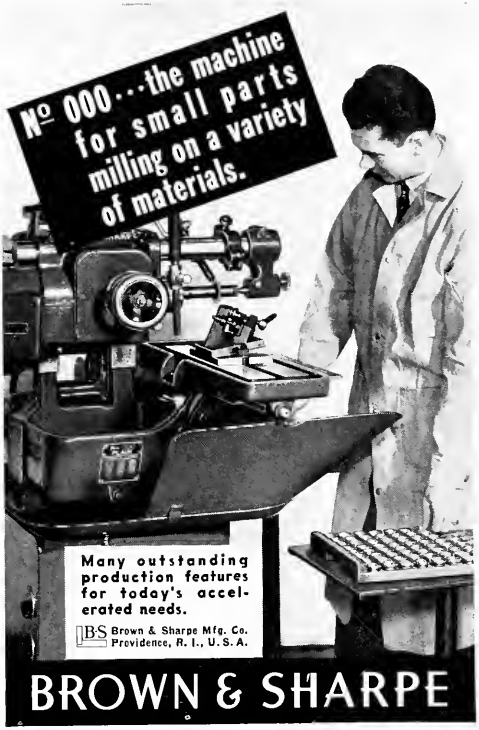

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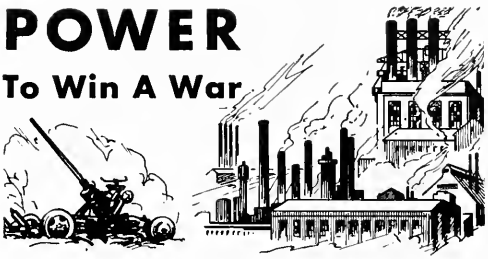

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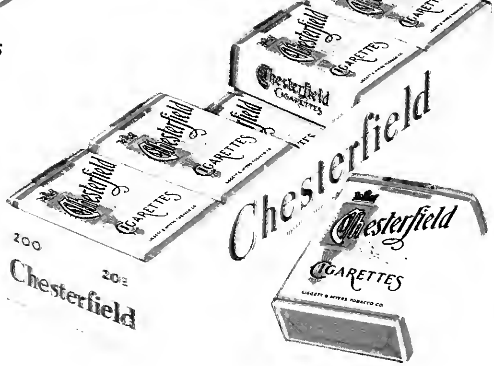

ILLINOIS TECH ENGINEER

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THE PUBLIC thinks of synthetic rubber in terms of tires, tubes, shower curtains and other finished products. But to the tire or rubber goods manufacturer it is simply a new *raw material* out of which he must fashion such products. And the basic differences between latex and the various chemical compounds we call synthetic rubber have given rise to many new and difficult problems of production. New compounding materials must be made available. New techniques for vulcanization, formulation and fabrication must be developed before large volume production of high quality synthetic rubber articles can be achieved. This is one of the biggest problems ever tackled by chemistry. And time is of the essence—for millions of tons of chemical rubber are needed to bring the war to a victorious conclusion.

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G-E Campus News

THE HOME GUARD

A DEVICE which can be installed in the home to give both audible and visible warning of air raids has been developed by J. L. Woodworth (U. of Idaho, '24) in the G-E Carrier Current Laboratory.

Designed to operate on carrier current systems, the new gadget makes it possible to contact air raid wardens and civilian defense workers without increasing the load on telephone lines.

When the air raid signal is sent from the transmitter at the power station, the home warning device (which resembles an ordinary house meter) begins to buzz.

After it has thus called attention to itself, the device lights up, and on its dial will appear a colored signal—yellow for preliminary caution, blue for advance caution, red for air raid, or white for all clear—that corresponds to the signal sent from headquarters.

"VEE" JEWELS

THE General Electric Company has developed a method of fusing a special type of glass and forming a miniature jewel. How it's done is a military secret, but the jewels are made on a mass-production basis.

The jewels, called "Vee" jewels (not V for Victory, but "Vee" for the V-shaped depression in which a cone-shaped steel pivot rotates), are in great demand for use in the indicating instruments that measure the flow of electricity in wartime fighting and industrial control equipment. The moving parts of these instruments are of watch size and delicacy, each requiring two Vee-shaped jewels about the size of the head of a pin.

The G-E "gem" has been developed as a substitute for the "Vee" jewels made from sapphires formerly supplied by Swiss craftsmen.

YOUR SMOKE IS SHOWING

A TRAIL of smoke often leads enemy submarines to their intended victims, but an electronic tube might help to give the subs the slip by instantly warning the ship's fireman when smoke is coming from the vessel's stack.

General Electric has already put the phototube, most versatile of the electronic tubes, to work in industrial plants to warn of smoking stacks and to save fuel. W. C. White (Columbia, '12), director of the G-E electronics laboratory, thinks a similar arrangement might be used in ship stacks.

A beam of light, thrown across the smoke column in the chimney, shines on the tube. When the smoke gets too thick, the light is blocked and the phototube works a relay which sounds a warning for the fireman.

GENERAL ELECTRIC

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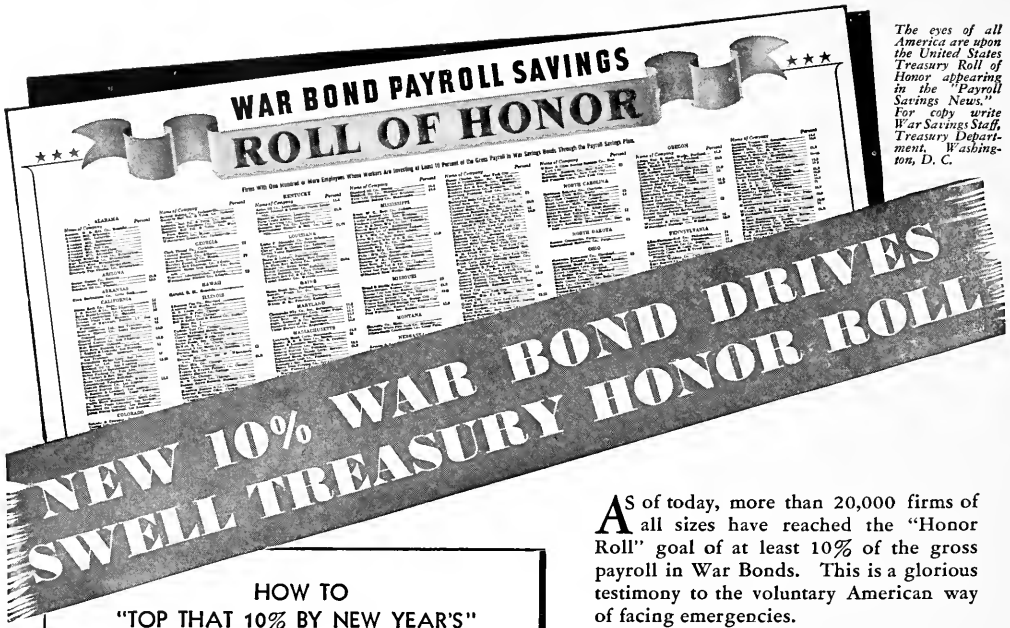

The eyes of all America are upon the United States Treasury Roll of Honor appearing in the "Payroll Savings News." For copy write War Savings Staff, Treasury Department, Washington, D. C.

HOW TO "TOP THAT 10% BY NEW YEAR'S"

Out of the 13 labor-management conferences spansored by the National Committee for Payroll Savings and conducted by the Treasury Department throughout the Nation has come this formula for reaching the 10% of gross payroll War Bond objective:

1. ***Decide to get 10%.***
   It has been the Treasury experience wherever management and labor have gotten together and decided the job could be done, the job was done.
2. ***Get a committee of labor and management to work out details for solicitation.***
   a. They, in turn, will appoint captain-leaders or chairmen who will be respansible for actual solicitation of no more than 10 workers.
   b. A card should be prepared for each and every worker with his name on it.
   c. An estimate should be made of the possible amount each worker can set aside so that an "over-all" of 10% is achieved. Some may not be able to set aside 10%, others can save more.
3. ***Set aside a date to start the drive.***
4. ***There should be little or no time between the announcement of the drive and the drive itself.***
   The drive should last not over 1 week.
5. The opening of the drive may be through a talk, a rally, or just a plain announcement in each department.
6. Schedule competition between departments; show progress charts daily.
7. Set as a goal the Treasury flag with a "T."

AS of today, more than 20,000 firms of all sizes have reached the "Honor Roll" goal of at least 10% of the gross payroll in War Bonds. This is a glorious testimony to the voluntary American way of facing emergencies.

But there is still more to be done. By January 1st, 1943, the Treasury hopes to raise participation from the present total of around 20,000,000 employees investing an average of 8% of earnings to over 30,000,000 investing an average of at least 10% of earnings in War Bonds.

You are urged to set your own sights accordingly and to do all in your power to start the new year on the Roll of Honor, to give War Bonds for bonuses, and to purchase up to the limit, both personally and as a company, of Series F and G Bonds. (Remember that the new limitation of purchases of F and G Bonds in any one calendar year has been increased from $50,000 to $100,000.)

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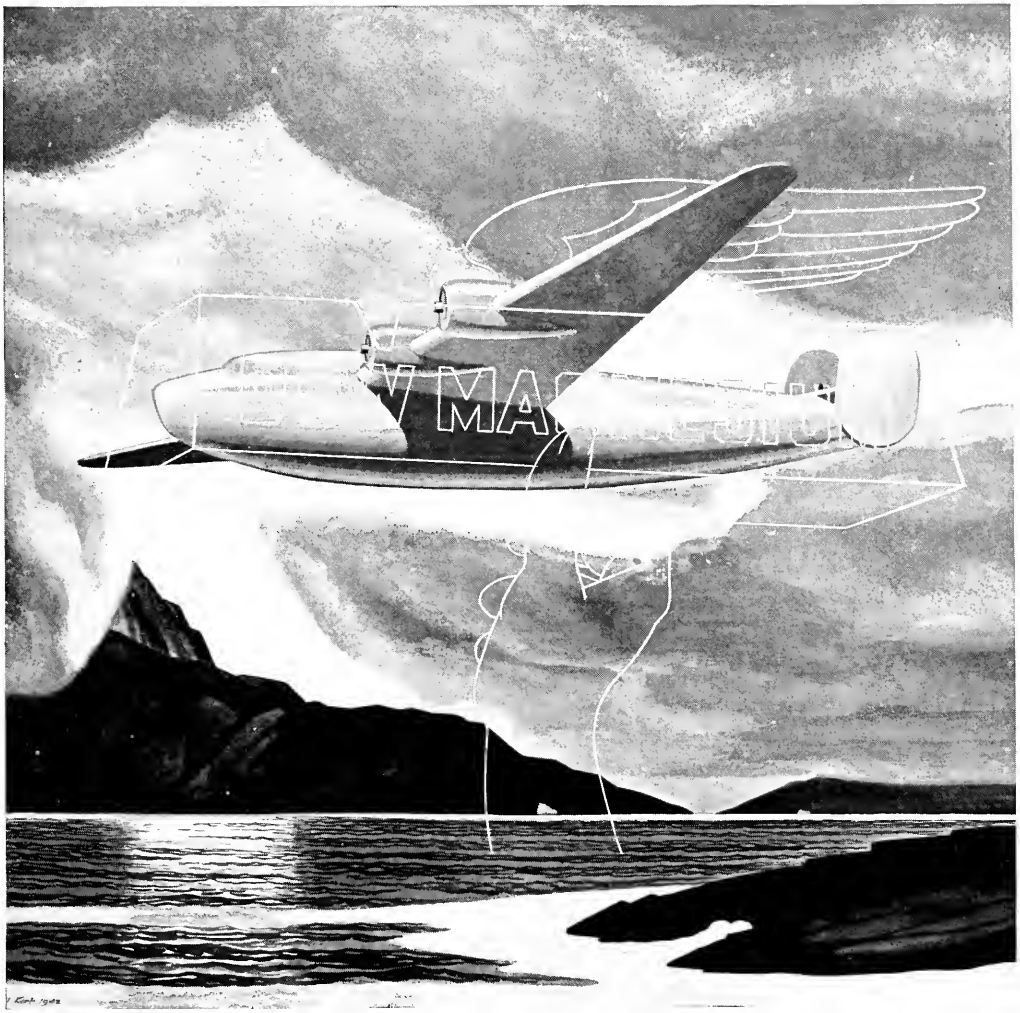

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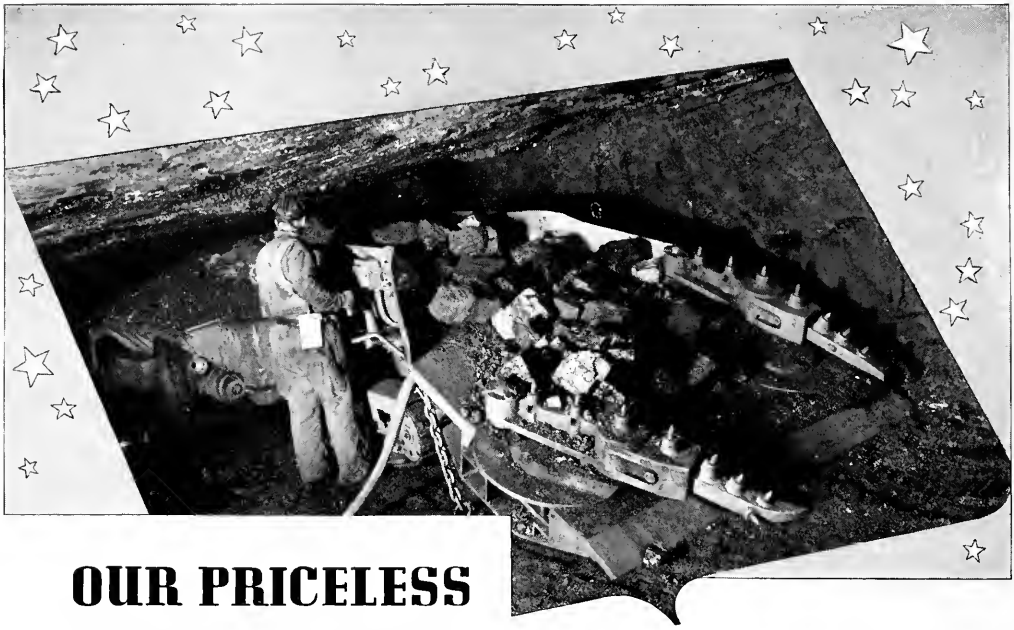

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The cover picture, **Rails**, is from a photograph by Bruce V. Kunde, a junior student in Electrical Engineering.

ILLINOIS TECH ENGINEER
AND ALUMNUS

DECEMBER 1942

VOLUME 8 NUMBER 2

IN THIS ISSUE

Published in October, December, March, and May. Subscription rate $1.50 per year. Editorial and Business Office, Armour College of Engineering of Illinois Institute of Technology, 3300 Federal Street, Chicago, Illinois.

RESEARCH IN ACOUSTICS AND VIBRATIONS AT ARMOUR RESEARCH FOUNDATION

By

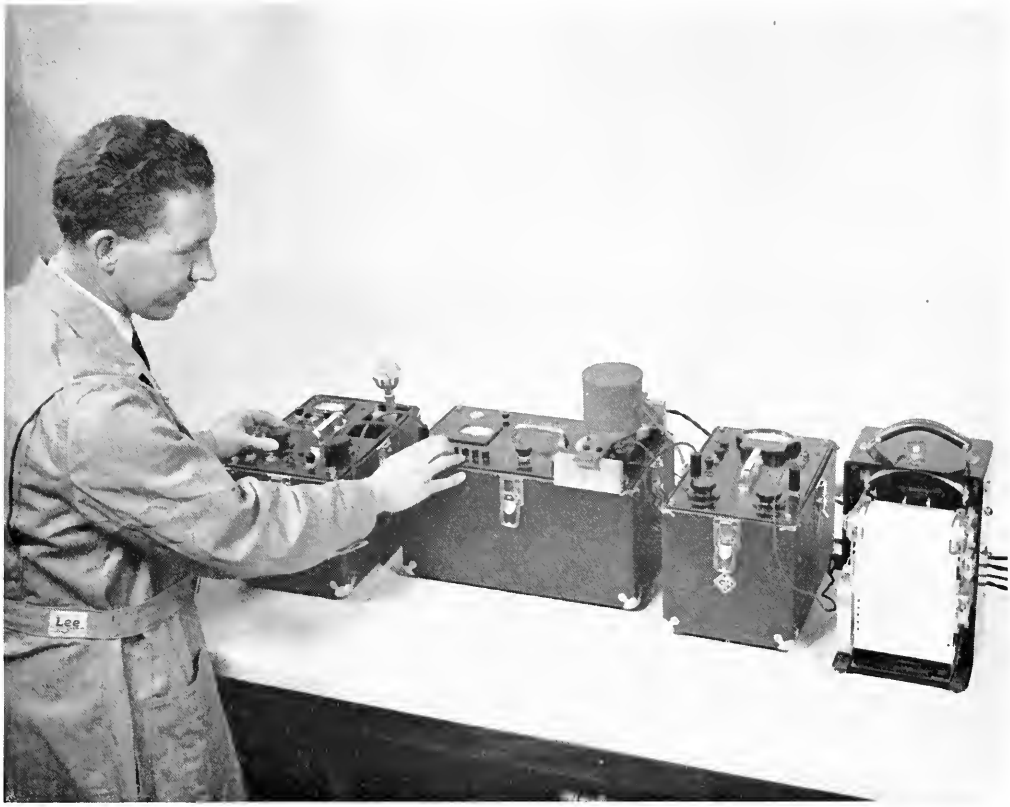
H. A. LEEDY

In 1877 a comprehensive treatise was written on the theory of sound by the noted English physicist, Lord Rayleigh. Thirty years later, very little of this theory had been applied, principally because of the lack of reliable, sensitive acoustical measuring instruments. Although reliable apparatus is certainly not the only requisite for an efficient research program, recent advances in applied acoustics have been ample evidence that good instruments, the tools of research, are of primary importance.

Probably the most important of the many tools, which have given the recent impetus to applied acoustics, has been the thermionic vacuum tube. Around this simple, ingenious device have been developed a wide variety of acoustical instruments such as audio amplifiers, audio oscillators, frequency meters and analyzers. Today it is easily possible to measure and analyze sound intensities as low as 1×10^{-16} watt per sq. cm. Even though present day instruments readily respond to these small intensities, it should be pointed out that they still fall short of the most sensitive of all sound detectors—the human ear.

Since the study of sound is essentially a study of vibrations, the work in both fields has been closely coordinated at the Armour Research Foundation. Methods and techniques developed for measuring or recording sound find their applications in studies of mechanical vibrations as well.

Acoustical Measurements Inside Sound Room with Sound Absorbing Panels in Place.



Automatic Recording Frequency Analyzer.

About four years ago only one instrument—a sound level meter—was available for acoustical research at the Foundation. At that time many of the acoustical measurements were made with difficulty or not at all. As the program at the Foundation has expanded, a wide variety of acoustical apparatus has been acquired until an excellent assembly of such equipment is now available for research in most of the specialized fields of applied acoustics and vibrations. These instruments are being constantly changed and improved to meet the ever-increasing, exacting demands of new problems.

Work in acoustics and vibrations is one of several fields included in the Physics Section of the Foundation. This work is closely coordinated with the electronics research program, and many valuable suggestions are interchanged. In fact, many of the problems arising in acoustics require consultation with our chemists, metallurgists and experimental engineers. The advantages of these consultations cannot be overemphasized, since in many cases they have greatly aided in the solution of difficult problems.

Today the whole program of the Foundation is primarily devoted, either directly or indirectly, toward aiding the war effort. In this important work the personnel, instruments and techniques, which have been used for acoustical and vibration studies, are contributing their full share.

Noise Reduction

A quiet machine is usually associated with well-balanced construction, and manufacturers realize that the abstract commodity, silence, is saleable. In many cases specifications are already set up for maximum allowable machine noise, which manufacturers are required to meet. Furthermore it has been found that a reduction of noise definitely increases human efficiency — a fact too little stressed in these critical times.

Because of the many advantages of quiet machine operation and quiet working conditions, considerable attention has been devoted to methods of reducing noise, either by the use of sound absorbing materials or by reducing the noise at its source. In most cases machine noise is highly complex, and its reduction requires a thorough study of the noise reaching the ear. At the Foundation, studies on noise reduction are made in a specially designed sound room, well isolated from the rest of the building and supported from the building floor by means of a resilient cork pad. Here

measurements can be made without the interfering effect of external noises. The walls of the room are hard reflecting surfaces, a desirable characteristic for many noise measurements. The room can also be turned into a "recording studio" by partially lining the walls with removable sound absorbing panels. In the room thus treated, high fidelity electrical transcriptions of the noise are made for later study and comparison.

The goal in many noise studies is to alter the sound, either by reducing its intensity or by changing its frequency, so that it is judged to be less disturbing or quieter by the average person. In all such cases, the ear must be the final judge. However, because of the difficulty in obtaining quantitative measurements with the ear, it is expedient to make physical measurements which will give an indication similar to the ear's.

One instrument for such physical measurements is the sound-level meter which gives the intensity (energy per second per unit area) of the noise. Several such instruments are available at the Foundation for these measurements. The first gives a visual indication on a meter. The second is a recording sound-level meter in which the intensity is recorded on a moving strip of paper. The third is a "high-speed level recorder" for measuring very rapid fluctuations of sound level. Each of these instruments is useful and necessary for specific applications.

Another instrument of valuable aid in noise reduction studies is the frequency analyzer with which the noise intensity at various frequencies in the audio spectrum can be measured. The instrument most commonly used in our measurements is the automatic recording, frequency analyzer in which the analysis is recorded by a pen on a moving paper strip. These measurements together with those of the sound-level meter give most of the information required in noise reduction studies.

Measurements and studies on noise have been made on a wide variety of sources. Many such studies are now in progress, including research on the noise reduction of large axial and centrifugal type fans for use by the Navy. Other noise studies which have been made or are in progress deal with calculating machines, copying machines, traffic noise, subway noise, automobile mufflers, steam valves, water valves and pipes, sewing machines, twine spinning machines, noise silencing hoods and Diesel engines.

Air Raid Sirens

In sharp contrast to the research on noise reduction has been the study of devices for producing intense sounds for use as air raid warning signals. Various air raid sirens have been tested for intensity, and analyses have been made to determine the frequency at which most of the sound is concentrated. Other studies have been made on the size and locations of such signals for the most efficient distribution of sound energy in large, densely populated areas.

The results of the noise survey which the Foundation conducted for the Greater Chicago Noise Reduction Council have been used to good advantage in determining the background noise level against which such sirens have to operate. The Founda-

Electrical Transcription Apparatus.

Measurement of Vibration Using Crystal Pickup, Low Frequency Amplifier and Oscilloscope.

tion has also cooperated with both the Civilian Defense Emergency Standards Committee, where tentative standards for air raid signals were drawn up, and with the Chicago Technical Committee on Air Raid Sirens, where the type and location of air raid signals were discussed and approved.

Because of difficulties in obtaining the necessary sirens, the complete air raid signalling system for the City of Chicago has not as yet been installed. Recent tests on the twenty new Victory Sirens have indicated that the proposed system, when complete, will give adequate coverage for all areas of the City.

The measurements on the intensity and frequency distribution of air raid sirens were made in open, level country at 100 feet (standard conditions). In some of the tests where it was not feasible to sound the siren for long periods of time, electrical transcriptions were made of these signals, using a high-fidelity disk recorder. Studies here were later made in the laboratory on the frequency distribution to determine the frequency components of these signals.

Architectural Acoustics

In many places such as auditoriums, theaters, radio studios, offices, restaurants and even in the home, it is desirable to avoid the disturbing effects of reflected sound. These reflections can be markedly reduced by the proper use of good sound-absorbing materials. Many such materials have been developed. From measurements of the absorption coefficients it has been found that most of these materials have good absorption at the high frequencies and that all have relatively poor absorption at the low frequencies. In other words, the perfect acoustical material has not yet been developed.

For purposes of studying the absorption characteristics of acoustical materials, a tube has been constructed in our sound laboratory, with which the normal absorption coefficients, as well as the acoustical impedance, can be measured. A particular advantage of this method is that only small samples (1 sq. ft.) mounted as they would be in practice are necessary. Because

(Turn to page 40)

THE PRESIDENT'S REPORT

This is no time for "education as usual." The primary problem facing every college today is not how its program can be preserved, rather it is how the facilities and resources of the college can best be utilized to make the most important immediate contribution toward the winning of the war. Illinois Institute of Technology has been working toward this objective since 1940. Its policy has been and will continue to be one of complete cooperation with all branches of the armed services and with war industry. In many cases, it has been possible to anticipate actual needs of the armed forces.

As a school of technology, our primary responsibility now is to train the ever-increasing number of specialists which modern war requires. Both in regular courses of study and in special supplementary programs to meet specific needs, this responsibility is being met with a high degree of efficiency. The next year will undoubtedly see further important adjustments in normal educational procedures. The Institute will make whatever changes the exigencies of war may dictate.

In spite of concentration on war service, many important permanent developments have taken place during the past year. These have increased the effectiveness of the Institute's war contribution. At the same time, anticipated developments in the educational and research programs have been postponed in favor of more important tasks immediately at hand.

The following report presents a brief summary of activities of the year ending August 31, 1942.

Faculty and Staff Tuned to the War Effort

The Institute has felt the impact of the country's shortage of trained manpower in its own faculty and staff. Numerous members of the faculty have been granted leaves of absence for military service or war research. Others have accepted attractive offers in war industry, while six have accepted positions in other educational institutions. In spite of the fact that total additions and replacements to the full time staff have been the same as losses, (32 vs. 32), the growth in activities during the year has been such that we are still shorthanded. However, we have been able to retain most of the key members of the organization, which has been built so carefully in recent years. In some cases, the faculty has been substantially strengthened in spite of the war.

Professional and civic activities of faculty members have increased greatly during the year, in spite of the fact that the war has produced a whole new range of responsibilities which are a severe drain on their energies and time. Any detailed account of publications, research or society activities would be entirely too long for this report. However, an important recognition of the Institute's work in fundamental research was the establishment here, in 1942, of a chapter of Sigma Xi, national scientific research association.

Retirement Plan Established

The action of the Board of Trustees in establishing a standard pension and retirement plan for faculty members and employees with the Teachers' Insurance and Annuity Association is a real source of satisfaction. The plan adopted is already in operation in nearly two hundred colleges and universities. It represents a permanent benefit which will have far-reaching significance to the future growth of the Institute.

Educational Programs Streamlined to Supply Trained Manpower

With every able citizen needed for national service, careful thought must be given to the amount of time to be used for college education. It also becomes imperative that this education must be of the type that is immediately useful in the national emergency. With these facts in view, several important changes have been made in the Institute's regular curriculum. Students in electrical engineering are being offered special advanced courses in electronics and micro-wave techniques to fit them for immediate service with the Signal Corps. The cooperative course in mechanical engineering and the new cooperative course in chemistry will operate on sixteen-week terms beginning in September, 1942. To permit earlier graduation, the length of these courses has been reduced from five to four years by eliminating a portion of the work periods. At the same time, an accelerated program, permitting year-round attendance on essentially a three-semester basis, allows for a reduction of the regular four-year course to about three years. Under this program, the engineering class of 1943 will graduate early in February. The five-year curriculum in architecture adopted a year ago has been again reduced to eight semesters work. Other changes are under consideration.

The U. S. Office of Education has made available a limited amount of money for loans to students in essential fields, enrolled in accelerated courses, who are within two years of graduation. This appropriation will assist students to offset the loss of ordinary summer earnings, although it is too small for really effective help.

During the summer of 1942, a carefully selected group of fifty high school juniors was enrolled in a special summer course. These boys spent four weeks in attendance at Camp Armour and nine weeks at the campus. At the end of the term, they were eligible for admission to the freshman class in engineering.

The regulations of the Selective Service System permit deferment of students preparing for essential occupations, who are within two years of the completion of their training and who show promise of success in their chosen field. Because of the critical shortage of technical personnel, the Institute has sought deferment on an individual basis for students who meet these qualifications. The proposed lowering of the draft age to eighteen may radically change this situation. It seems logical that the nation's military forces should have first call on all able-bodied young men, and that the amount and type of training they

receive will be largely determined by the Army and Navy. The enlisted reserve classifications for college students provide an opportunity for the young man to select his branch of service. Present indications are that students in the reserve will be called to active service soon after reaching the age at which they are liable for Selective Service.

No plan has yet been adopted which provides for the complete allocation of manpower to meet the needs of military services, war industry, and essential civilian occupations. The over-all problem is extremely complicated and it is inevitable that considerable confusion should exist. It is to be hoped that the War Manpower Commission may be able to develop a more comprehensive plan for using the nation's manpower and womanpower.

Plans are now being formulated whereby all Illinois Tech students may receive more complete physical training. Lack of adequate facilities makes this problem particularly difficult, but in no sense does it relieve us of the responsibility for the physical development of all students.

Special Training Offered to meet Specific Needs of Army, Navy and Industry

Special war training courses begun early in 1941 have been continued and expanded during the current year. These courses are financed by federal appropriation and offered in cooperation with the U. S. Office of Education. They are designed to provide special short-term supplementary courses on the college level to meet the needs of war industries and government agencies. Illinois Tech has provided the largest portion of this training in the Chicago area. In fact, the total enrollment of approximately 15,000 is the largest number of trainees in any single city. The needs for this work in Chicago are becoming increasingly acute. War contracts in this area now exceed $4,000,000,000. This will result in an increasing shortage of technical personnel which can be met only by such training.

The Institute's Engineering, Science and Management War Training program has included large numbers of part-time classes in a wide variety of technical fields designed primarily to upgrade existing employees of war industry. Several full-time training courses designed to produce new personnel in essential fields have also been offered. Of particular importance among these are the junior inspector training courses for the Chicago Ordnance District, the training of 4-F men for naval inspection service, and ultra-high-frequency training for officers and employees of the U. S. Army Signal Corps.

The Institute pioneered in the offering of full-time training for women in inspection, drafting, and industrial chemistry. More recently, the enrollment of women in all E.S.M.W.T. courses has increased substantially. It is, of course, necessary that more and more women be trained to take the place of men called to the armed forces.

A feature of the war training work has been the development, at the request of the Signal Corps and under the direction of Jesse E. Hobson, of some of the most complete laboratories for training in communications to be found anywhere in the country. Approximately 600 Signal Corps employees are now receiving instruction in pre-radar under an Army contract at the Lewis campus. In addition, several hundred are in E.S.M.W.T. courses in electronics and ultra-high-frequency. More than $100,000 has been spent on equipping these laboratories.

Approximately 1,000 employees of war industry were enrolled in a part-time course in industrial safety given by the Institute in eight Chicago high schools.

John I. Yellott, chairman of the War Training Committee, deserves the highest praise for his excellent work in organizing and operating these special programs. He has received splendid assistance not only from other faculty members but from the officers of the Signal Corps, the Ordnance District, the Chicago Board of Education, the National Committee for the Conservation of Manpower in War Industries, numerous civic and trade associations, as well as the industrial personnel of Chicago. Most of the instructors used have been drawn directly from industry.

The war training program will be continued during the coming year. Always designed to meet specific needs as they arise or can be anticipated, it must be ever flexible in form. Already, all available space in both plants is in use, and it will be necessary to continue the practice of renting space in other portions of the city wherever additional expansion is indicated.

Enrollment Is Largest in History

Applications for admission to the freshman class in 1942 are the largest in history. The war was responsible for some decrease in evening class attendance during the last year but regular day enrollment continued at capacity. Total enrollment for the year 1941-42, exclusive of special war courses, was 6,923, of which 2,540 attended day session.

The Development Program Reaches Halfway Mark

The policy committee of the Board of Trustees, under the chairmanship of Wilfred Sykes, president of Inland Steel Company, has made major progress during the year in securing funds to carry out the Institute's plan for the construction of a new plant. The acquisition of the necessary additional campus property has been practically completed, and much of it has already been cleared of old buildings. Approximately one half of the $3,000,000 projected for the special development program has been subscribed by companies and individuals. Specific commitments on the part of quite a few corporations and individuals are in the making. The committee plans an intensive cultivation of these along with many new contacts. The community's response to the Institute's request for funds for new facilities has been extremely gratifying, and is additional evidence of a keen appreciation of the important work being done. This token of confidence renews our zeal and rededicates our efforts to finish the job. Our minimum goal of $3,000,000 is none too much to meet the exacting requirements clearly seen in the days ahead.

Actual construction of new buildings has so far been limited to the new metals research laboratory now near completion. This building when finished will be one of the most complete and modern laboratories of its kind. It is being built in accordance with the designs for the new campus and will be largely devoted to the work of Armour Research Foundation. Other buildings planned for construction this year were a library and large building to house the metallurgical and chemical schools. Construction of these has been temporarily postponed due to the difficulty in obtaining strategic materials. The Institute is extremely grateful to the ever-increasing number of companies and individuals who are providing the initial impetus to make the development program possible.

Parmly Foundation

The late Samuel P. Parmly, a prominent citizen of Chicago who died in 1938, left a portion of his estate in trust to be given to an institution of higher education in the State of Illinois, for the establishment of a program of research in aid to the deaf.

In August, 1942, the fund totaling approximately $300,000 was assigned to Illinois Institute of Technology, and the Parmly Foundation for Research in Hearing was created a part of the Institute's work in physics. Peter J. Mills was appointed Director of the Foundation and Associate Professor of Physics.

Joseph C. Belden Scholarship

One of the most interesting gifts of the year was a contribution of $5,000 from the Belden Manufacturing Company for the establishment of the Joseph C. Belden Scholarship, in honor of the founder of the company. This gift, which was announced on the occasion of the fortieth anniversary of the company, is to provide $500 annually for one or more scholarships to be awarded to students in engineering, over a ten-year period. This scholarship provides a living memorial to one of Chicago's pioneer industrialists whose energy and ability resulted in the establishment of a highly successful electrical manufacturing concern.

Electron Microscope

A splendid gift by a graduate, who prefers to remain anonymous, made possible the purchase of an electron microscope. This instrument now being installed in the department of physics will be an important addition to the Institute's scientific equipment.

A. C. Network Calculator

Negotiations with a number of midwestern power companies have resulted in arrangements being made to install an alternating current calculating board at the Institute, to be operated by the staff of the department of electrical engineering and used by the power companies in the investigations of their central station problems. An order for this board, which will cost approximately $80,000, has been entered, but the shortage of strategic materials will probably postpone its construction until after the war.

Gifts to the Library

The library received numerous gifts during the year, the most important being the Nikodem Caro collection of some 1300 volumes, obtained through the influence of Carl A. Grasse, '16.

Alumni Affairs

During the year, the alumni of Lewis and the alumni of Armour made common cause in the formation of the Alumni Association of Illinois Institute of Technology. A permanent alumni office has been established under the direction of an executive secretary. Alumni records have been greatly extended and improved. Branches of the Association have been organized in New York, Philadelphia, Washington, Pittsburgh, Indianapolis, Cincinnati, Milwaukee, Rockford, Buffalo, Cleveland and Minneapolis.

Alumni interest has been at a high level and the Institute's service to its alumni through the placement department, publications, and assistance with problems arising from the war has been greater than ever before.

It is a great satisfaction to be able to record that the first annual Illinois Tech alumni giving program has been a real success. Carefully organized under the leadership of Adolph Fensholt, '16, this plan offered alumni the opportunity to contribute to the general development program or to earmark gifts for the field house fund or the furnishing of the Carman Memorial Library. Hundreds of alumni showed their interest not only by subscribing but also by actively working on the program. All told, 2,635 alumni contributed $50,494.75, and this in spite of the fact that more than six hundred are already serving in the armed forces.

Placement

The task of the placement department during the past year has not been to find jobs; rather it has been to find men. John J. Schommer reports that one-hundred per cent of the graduates of 1942 were placed, with an average of five jobs per man, in the engineering fields. Average salaries were ten per cent higher than in 1941, and more than fifty per cent higher than in 1938. About twenty per cent of the graduates were commissioned in the armed forces.

Alumni placements handled through the Institute exceeded all previous records. The office is rendering an important service to graduates as headquarters for information about Selective Service, special opportunities in the armed forces and in government agencies.

Armour Research Foundation

The Armour Research Foundation was started just six years ago with three staff members and one laboratory. It now employs one hundred thirty-five full-time research workers and their assistants, and occupies three campus buildings. Its rapid growth is ample evidence of the need for a research and experimental engineering service to help solve industry's technical problems. Now one of the three largest organizations of its kind in America, the Foundation is making many significant contributions to problems of war industry and governmental agencies. Services performed by the Armour Research Foundation are an important adjunct to the program of education and fundamental research carried on by the Institute. The complete record of its accomplishment, as set forth in its separate report, is a fascinating story.

Institute of Gas Technology

The newest member of our technological family, established only a year ago, in cooperation with leading gas companies and gas appliance manufacturers, has developed satisfactorily. Its educational and research programs are now well established, and the foundation for sound future growth has been laid. Twelve carefully selected graduate students will be enrolled this fall, and several important research projects are under way.

The appointment of Dr. F. W. Sullivan, formerly director of research for Standard Oil Company of Indiana and more recently manager of chemical research at the Barrett Company, as technical director, substantially strengthens its scientific staff.

Financial Comments

A study of the annual statements discloses a healthy financial condition. Current operating income has again exceeded current operating expense by a reasonable margin. Largely due to the development program, the combined assets of the Institute and the Research Foundation have increased about $1,500,000 during the year. Although substantial progress has been made during the year, financial resources are still inadequate to carry a program of the quality and magnitude which the Institute's responsibilities demand.

Board of Trustees

Colonel Bion J. Arnold, for many years a trustee of Lewis, and, since the merger, a trustee of Illinois Tech, passed away on January 29, 1942. Colonel Arnold had a long and distinguished career as an engineer and was a leading citizen of Chicago. He received the honorary degree of Doctor of Engineering from Armour in 1907!

New members of the Board elected during the year were C. Donald Dallas, president of Revere Copper and Brass Inc., and Harold S. Vance, chairman of the board of Studebaker Corporation.

One of the greatest assets of Illinois Institute of Technology is its Board of Trustees. Individually and collectively, the trustees are serving the Institute with enthusiasm, judgment, and diligence. With this type of leadership, there can be no question about the steady forward progress of the Institute's whole program.

Henry Townley Heald.

RESEARCH IN THE DEPARTMENT OF LANGUAGE AND LITERATURE

By

WALTER HENDRICKS

One has only to look at the contributions to the war effort of the schools of technology to realize what an excellent service they have performed and are performing at the present time. Into four short years they pack an astonishing amount of fundamental education, education that is practical, objective, and realistically adjusted to our scientific and industrial age.

There is a difference among technological schools, however, regarding their attitude toward humanistic subjects, such as English, history, and languages, as part of a technical curriculum. At institutions where there is mere tolerance, or apathy, the lot of a Department of Language and Literature is not a particularly attractive one.

Fortunately this is not true at Illinois Institute of Technology. The establishment of a graduate school, of a research foundation, and of graduate work in gas technology attest the fact that the Administration is fully aware of the professional role the engineer will assume in building up the post war world.

In the undergraduate school, the situation is the same. The administrative officers of the Institute are like a conductor of a skillful orchestra. The first violins may be the members of the Department of Mathematics or of Physics. The Department of English, or of Language and Literature, may well be, as far as this orchestra is concerned, the bass viols, the players of the xylophone, or even the drummers. In an orchestra, as anyone well knows, there is no unimportant part. If a concerto requires but one single drum beat, that beat must come in at exactly the right moment and be of the proper pitch and intensity, and the drummer must be as expert at his druming as the violinist playing his instrument.

The Administration has, accordingly, insisted on having the best. It will not admit that it has less to offer in the Department of Language and Literature than have the leading institutions in the country, whatever their character. An official of a teacher's agency, when informed of the qualifications which we required of an instructor, once complained, "Why, only two or three schools in the country demand anything like that."

It is true there are no opportunities for offering graduate courses, but there is ample opportunity to teach the subject of one's specialization to properly qualified and interested upper and lower classmen; besides, every encouragement is given for the professional development of the scholar himself in research and publication; and the environment is one of friendliness and good fellowship — advantages which do not flourish in every educational garden.

The students, moreover, are the direct beneficiaries of all this good. Every member of the staff is interested not only in research, but in teaching as well, and every member is available to the students, whose education it is our business to supply. They are given the best that can be offered anywhere, and they realize this and value it accordingly. As to the quality of the students, it may well be mentioned here that they rank among the highest one-fourth in the country, and because of the invaluable work of the Department of Tests and Measurements the Institute hopes and expects that the quality will steadily rise.

There is not sufficient space allowed for mentioning all the work that is being done to extend and to increase the effectiveness of the education of our students. Nor is it possible for me to list the interests and achievements of all the members of the Department. But I shall speak of several.

At the present moment Dr. Sanford B. Meech is engaged in preparing a book on the Imagery in Chaucer, after having spent two or more years in exhaustive and painstaking research. A previous work, *The Book of Marjorie Kempe,* a study of a 15th century English mystic, was widely praised as a piece of scholarship of the highest quality. This first autobiography written in the English language was published by the Early English Text Society. Dr. Meech somehow finds time also to serve as Associate Editor of the *Illinois Tech Engineer and Alumnus.*

Dr. S. I. Hayakawa, whose recent *Language in Action* became a Book-of-the-Month Club selection, is also working on a second book, a book on Symbols, that will extend his research in Semantics. *Language in Action* was reviewed in more than two hundred periodicals, and selections from Dr. Hayakawa's writings are now included in several anthologies of contemporary prose. Dr. Hayakawa has given more than fifty lectures during the past year, and he has recently been made Editor of *ETC.,* a Journal of General Semantics. He is also a reviewer for *Book Week* and the *Chicago Sun* and contributes a weekly column for the *Chicago Defender.* He is on the Committee on Communication in the National Council of Teachers of English and on the committee on Semantics in the American Dialect Society. Outside of academic circles

(Turn to page 41)

SIGMA XI AT I. I. T.

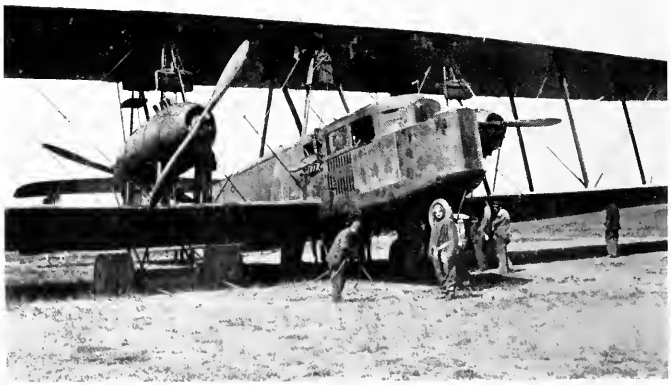
By
RUFUS OLDENBURGER

The largest scientific organization in the world is the Society of the Sigma Xi with a membership in excess of 40,000. Initiates are elected to this society on the basis of scientific ability and scientific research achievements only. Unlike the honor societies Tau Beta Pi and Phi Beta Kappa, Sigma Xi usually elects only men and women who are holders of the master's and doctor's degrees, although some chapters take in a few outstanding undergraduates. There are two types of membership, that of full member and that of associate, a person being eligible for promotion from associate to full member after the production of one or more pieces of important scientific research.

The first initiation of new members of the local chapter occurred on April 30, 1942, in conjunction with a lecture by the famous mechanical engineer Lionel S. Marks of Harvard University. The members admitted were chosen on the basis of most exacting standards of scholarship, some of them being undoubtedly the greatest in their respective domains of activity.

Six men of the teaching and research staff of the Illinois Institute of Technology were elected to full membership in recognition of their numerous scholarly publications and distinguished service in the field of scientific research. They are Drs. Reissner, Komarewsky, Reed, Sadowsky, Busemann, and Schwartz-Kast.

The thesis of Dr. Hans Reissner, research professor of engineering, presented in 1903, was on the oscillations of frame structures; it was the first complete and consistent treatment of the dynamics of these structures. In the field of elasticity he also published a paper (1912) on "Spherical Shells," which gave the first method for the structural analysis of thin shells with and without bending resistance, from which all later development has started. Prof. Reissner's main contribution to physics was a paper giving the gravitational field of a spherical electric charge by the general theory of relativity of Einstein (1916). In the domain of aviation Prof. Reissner's contributions have been particularly numerous. He designed the first all-metal steel-aluminum plane, built in 1912-13, and in 1917 he invented the first really practicable controllable-pitch propellers, which were used in the ten-ton, four-engined planes of World War I. To the subject of constant-speed propellers he has contributed extensively and continuously up to the present day. Pioneer investigations were reported in his series of papers on static and dynamic stability and control, which brought out the peculiar distribution of the longitudinal oscillation modes, the theory of lateral control in curved flight, and the instability of the spiral dive. A paper published in the technical reports of the German Army Air Corps in 1917 gave the first theory of the stresses and deflections of propeller blades under the action of thrust and torque and the restoring action of centrifugal force. Until he came to this country, Dr. Reissner was the leading propeller expert in Germany. A series of papers which appeared from 1912 to 1932 developed systematic adaptation of safety requirements, structural analysis, and deflection theory for aeronautical engineering. In 1937 and 1940 Prof. Reisner published two papers in this country on the vortex theory of the



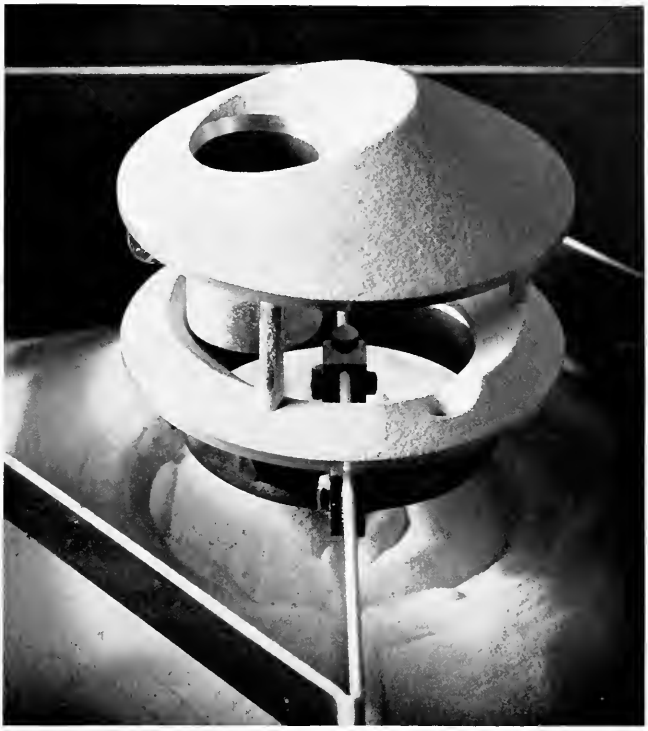
The bomber shown above, used in World War I, used the first controllable-pitch propellers. They were invented by Dr. Reissner.

screw propeller, which have brought a new approach to and new methematical proofs of the influence of parasite drag on blades. In 1942 he contributed a paper on the oscillations and flutter theory of suspension bridges to explain the Tacoma bridge failure. These are but a small part of his accomplishments. He has been professor in the Technische Hochschule (engineering college) in Berlin, a member of the German air ministry, and has held other important positions.

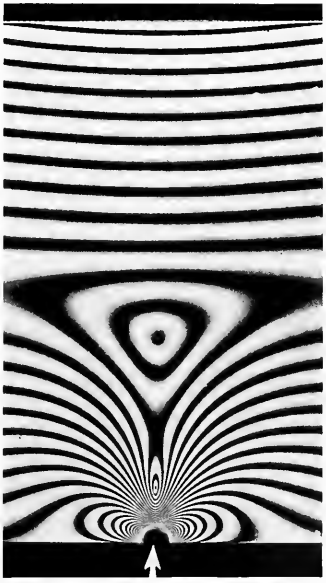
Dr. Vasil Komarewsky, professor of chemical engineering at the Institute, wrote his doctor's thesis on the "Nickel-aluminum Catalyst for Dehydrogenation of Cycloparaffin Hydrocarbons" under the famous Russian chemist Zelinsky, receiving the doctor's degree in 1925 from the University of Moscow. The catalyst studied in this work was prepared by a new method of coprecipitation and was studied and used by numerous investigators in different countries. His first five years after graduation were spent on the chemistry of cellulose and solid fuel in the Kaiser Wilhelm Institute (Berlin) and at the State Institute of Solid Fuels and the Moscow Academy of Mines. During this period he developed a quantitative method for the determination of cellulose. In 1930 he was invited to the United States to work for the Universal Oil Products Co., where he was the co-discoverer of numerous catalytic processes for the production of aviation gasoline, synthetic rubber, and high explosives. Outstanding was his discovery of the reaction of alkylation of paraffin, and of cycloparaffin hydrocarbons for aviation gasoline. Since 1936 he has been at the Institute, where he has developed complex action catalysts which make possible several chemical processes at the same time. He is co-author of a book, *Isomerization of Pure Hydrocarbons* which has just been published by the American Chemical Society.

Dr. Myril B. Reed, associate professor of electrical engineering, took his doctor's degree in physics. Author of a textbook on electrical engineering, he has published papers on electrical network theory with particular emphasis on the application of a modern branch of mathematics, called "matric algebra," to this field.

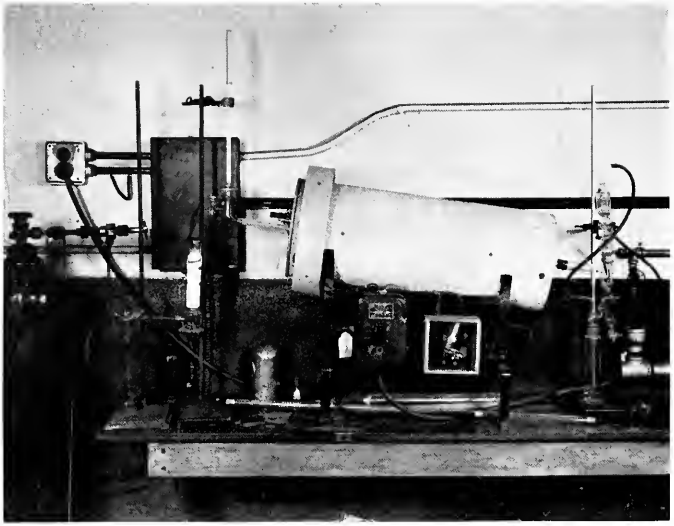
Dr. Michael Sadowsky, assistant professor of mathematics, has specialized on the theory of elasticity. From photographs of steel plates, and his mathematical theory of the stresses, one can compute the stresses in a plate plastically strained. He de-



Above: Sand heap model used by Dr. Sadowsky for stress studies in plasticity. Photograph by Dr. A. Nadai, Westinghouse Research Laboratories.



Right: Photograph of stress pattern of a beam showing two black spots. Made by Prof. M. M. Frocht, Carnegie Institute of Technology. Printed by permission of John Wiley and Sons.



Catalytic laboratory apparatus used by Dr. V. I. Komarewsky in the production of aviation gasoline.

veloped the theory of "singular points" in photoelasticity which explains black spots on photographs of strained materials.

Dr. Herbert Busemann, instructor in mathematics, has contributed extensively to geometry, having recently (1939) published a book on contemporary researches in this field. He has investigated surfaces which, with the sphere, share the property that a straight line cuts them in only two points. He studied the concept of distance in general spaces, such as those used in the general theory of relativity. On such spaces an object cannot in general be moved freely, but is seriously restricted. Dr. Busemann solved the problem of determining the spaces, such as ordinary Euclidean spaces, in which all objects can be moved freely, a problem stated in 1868 by the well-known physicist Helmholz.

Dr. Ernst Schwartz-Kast, electrical engineer, of the Armour Research Foundation, is responsible for a large part of the modern theory of the electrical equipment of cranes. He has developed simple control devices for wide-range speed regulation of induction motors, an automatic leveling system for elevators, and numerous other contributions to the applied sciences.

The other new full members of the I. I. T. chapter of Sigma Xi are Mr. William Goodman, who did fundamental work in air conditioning and obtained a master's degree in 1936 from the Institute in this field; Dr. Charles H. Reisz, now of the Gas Institute, Ph.D. of I. I. T. in 1939 and co-author with Dr. Komarewsky of a process of making synthetic rubber which avoids most of the undesirable carbon deposits of past methods: Mr. Arthur Goldsmith, electrical engineer, now Lieutenant (J.g.) in the U. S. navy, who developed a recorder for obtaining torque-speed characteristics of motors for his master's degree at I. I. T. in 1940; Dr. William M. Simpson, and Dr. Robert M. Levy, who obtained the Ph.D. degree in 1942 at I. I. T. in the fields of structural engineering and chemistry, respectively. Dr. Simpson's doctor's thesis was on automatic design methods for multi-story frames; Dr. Levy studied the physico-chemical aspects of the treatment of cellulose materials.

The associates elected were Francis C. Breeden, Gerald Carne, Clark A. Crawford, Richard Harbin Edwards, William R. Kennedy, Henry Frederick Newman, Anton Stanley Pater, Francis T. Pierce, Robert H. Saunders, William H. Sparing, Rodolfo M. Soria, Elia Sternberg, Harvey J. Taufen, Valentin Alexander Vasilevsky, and Richard John Wagner. All of the associates wrote superior master's theses at the Institute in the sciences and engineering.

During the academic year 1942-43 there will be five lectures sponsored by the local chapter, the first of which has already been given by Professor Fay-Cooper Cole, Chairman of the Department of Anthropology of the University of Chicago, on the timely subject "An Anthropologist's View of Race." Through these lectures by local and outside distinguished scientists, as well as by other activities, the local chapter will endeavor to encourage interest in research in pure as well as applied science.

WAR RESEARCH COMMITTEE

A research committee to authorize, conduct, and integrate research projects related to the war has been formed at the Institute. It will maintain suitable relations with research men in national groups, scientific, educational and governmental.

The committee will operate under the chairmanship of L. E. Grinter, vice-president and dean of the graduate school. Its membership will include all faculty members who are doing approved special research on any project related to our war needs. Membership now comprises about twenty-five men, whose names will be divulged only to authorities interested in the specific projects. Others will

(Turn to page 42)

THE PRE-ENGINEERING COURSE

In the spring and early summer of this year forty-eight young men who had completed their junior year in high schools of Chicago and the surrounding towns were selected to take the new Pre-engineering Course at the Institute. This course was designed to prepare these carefully chosen students for entrance into the regular Freshman Class of Armour in 1942. In the weeks from June twenty-fourth to September eighteenth the essential parts of the work of the senior year of the local high schools were given to them as well as some subject matter not ordinarily presented in the secondary schools. And for four of these weeks, a strenuous program of calisthenics, group games, and outdoor work was followed to build up the men physically and to develop in them the traits necessary for both teamwork and leadership.

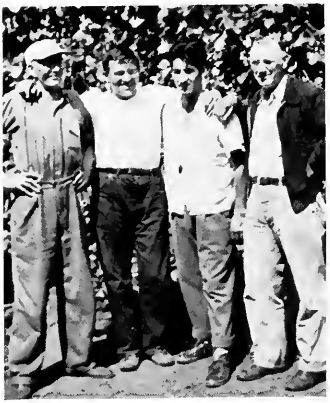
To give this ambitious program a fair chance of success, it was necessary to choose with special care the students who were to follow it. The academic records and the extra curricular activities of the candidates were closely studied. Professor William C. Krathwohl, Director of the Department of Educational Tests, administered a battery of examinations to them, which, as results were to prove, measured their intellectual abilities with remarkable accuracy. Other members of our faculty interviewed the men and carefully recorded their impressions of the personality and social adaptability of each. Although their judgments did not, in the opinion of the writer, prove to be as accurate predictions of the students' overall success as Professor Krathwohl's tests, they were of great value, for the boys finally selected were not only exceptionally able as a group, but also as pleasant and cooperative as one could wish to lead.

The material presented to them was organized in five courses, namely: American History, Engineering Orientation, English, Mathematics, and Physical Science. The first was a survey of the history of the English Colonies and of the United States taught

Left above: First camp group.

Left below: Second camp group.

Below: Faculty of second camp group.



by Professor Hendricks and myself in the first eight weeks of the course. The second was a discussion of typical engineering problems given for four weeks by Professor S. M. Spears and Professor John C. Penn. English, offered by Professor Hendricks and myself, was a composition course continuing through the entire summer period, in which the students reviewed grammar, read some of the standard American authors as models, and wrote extensively. Mathematics, taught by Professor Samuel F. Bibb, Dr. Irwin E. Perlin, and Dr. Walter S. Snyder, included a review of arithmetic and elementary and advanced algebra undertaken during the first eight weeks, and solid geometry studied in the last four. Science comprised eight weeks of Physics taught by Professor James S. Thompson and four weeks of Chemistry given by Dr. Edward S. Bicek.

These, it was hoped, would fit our above-average students for the work of Freshman year as well as the more protracted course of study in the last year of high school would equip the average boy. A typical program for this year is as follows: Solid Geometry, one semester; Chemistry or Physics, two semesters; Civics, one semester; Economics, Commercial Law, or Social Science, one semester; English, two semesters; and Trigonometry, one semester.

Our students were divided into two sections for the entire period. For four weeks, one studied on the South Side Campus, and the other at the Armour Engineering Camp at Trout Lake near Minocqua in northern Wisconsin; for the second four, they exchanged locations; and for the rest of the time both were on campus. Engineering Orientation was taught only at camp, and Physical Science only on campus, whereas the remaining subjects were given at both places. Classes met five times a week in Chicago, and six times at Trout Lake.

The life of the student in Chicago was very much like that of our ordinary undergraduate. On campus, he attended classes, studied in the Union, or in the Library, and used the athletic equipment or not as his fancy dictated. Most of the boys commuted daily from their homes, where they did a good deal of their daily assignments. Whether they chose to be diligent or not was strictly their affair. To their credit, nearly all applied themselves to the best of their several abilities.

Existence in camp was very different. From early rising to early bedtime, except for Saturday evening and Sunday, most of the detail of the student's life was fixed for him. Beside four class hours six days a week, there were two supervised study periods five days a week, one of an hour in the afternoon and one of two in the evening. Interspersed between these times of intellectual effort, there were calisthenics thrice daily and games of baseball, basketball, football, volleyball, badminton, and horse shoes. On the theory, perhaps, that too much play would make Jack a dull boy, the energetic athletic director, Mr. Dominic Parisi, supplemented these activities of the boys with tree cutting, road-making, and beach-cleaning. Then there were beds to make, and—at least for Saturday inspection—cabin floors to be swept and scrubbed. Each man had a week of K.P. under the watchful eyes of our three cooks.

Rising at six-thirty and going to bed at ten was a new experience for most of the boys and for at least one of the professors. It was a beneficial one, too. Appetites were sharpened, to be abundantly satisfied by plain North Woods food. Muscles became harder as well as sorer. No one found the pace too taxing. There were always hardy spirits who, after a day of strenuous activity, were eager to make the long trip to Minocqua for a Saturday evening in the movie or the drugstores. And not a few of these, as well as others who had remained quietly in camp, were ready for the trip back to town for Sunday morning religious services. Sunday afternoons saw our oarsmen exploring the lake and trying—in the main unsuccessfully—for fish. Under the experienced direction of Professor Spears and, after his leaving for the Army, of Professor Penn, every boy came to the end of his stay without injury or even threat of any and with improved health and a wealth of new experiences.

Teaching at camp was a fascinating pedagogical experiment. The entire educational process was carried on under the teacher's eyes, to his edification at least as much as the boy's. He saw in the study periods what was done with his assignments. The students' questions at these times showed him which sections in the textbook were hard or dull for teen-age minds and which were not and which parts of his day's teaching had "taken" and which not. At the dinner table and on the playing field he gained franker reactions to his classroom instruction and exhortation than he could hope for—or fear—on the campus.

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1800 ENSIGNS

Through a newly accelerated officer training program, the Navy is offering enlarged opportunities to college graduates not over 27 years old to become commissioned Naval officers in a special year-end midshipmen's class.

Enrollment of a class of 1,800 must be completed almost immediately, Capt. E. S. Root, Chicago, Midwest Director of Naval Officer Procurement, has revealed.

He announced that the special school, under the Navy's V-7 program, has been ordered to turn out a class of ensigns before next June's college graduates accepted in V-7. The special school, starting no later than January 1, will be divided between existing midshipmen training centers at Northwestern and Notre Dame Universities, the New York Naval Reserve Midshipmen's School, and the United States Naval Academy.

Men in the special class will enroll as apprentice seamen in V-7 for four months' training in the Navy's wartime midshipmen schools. For the first month those accepted will be apprentice seamen in Navy indoctrination. For the next three they will be midshipmen.

Midshipmen completing the instruction successfully will be commissioned as ensigns in the United States Naval Reserve. Those who fail will be discharged to their former civilian status or, if they choose, may remain in the Navy in an enlisted status of their choice and qualification.

Aside from possessing degrees, applicants must show credit for a year of college mathematics. Men without that, however, may be accepted if they agree to complete such a course, by correspondence or by personal attendance, within ninety days after enlistment.

Current speed in the program requires enlistments within the next few weeks. As a part of V-7, which also applies to college undergraduates, this special program is open to college seniors who will receive their degrees by January 1, 1943.

Both married and single graduates are eligible. The latter, however, must agree not to marry during their training period. Physical requirements include a minimum height of 5 feet, 4 inches, and weight in proportion to

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NEW FACULTY MEMBERS

Anthony T. Balint, Assistant Professor of Technical Drawing, holds a diploma in Mechanical and Electrical Engineering from the Royal Hungarian University for Technical Sciences, Budapest, and the degree of Industrial Engineer from the same university. He has his M.S. degree in Electrical Engineering from the University of Michigan. He spent fourteen years in industry with Ganz & Company, a manufacturing concern in Hungary. His experience includes design of electrical equipment, project engineering, research, and one year in charge of erection of power plants in the Nile delta. In 1939 and 1940 he worked in the United States as a consulting engineer for the same organization and for a Swiss company. Mr. Balint has written various articles on engineering subjects, and has taught Engineering Drawing and Design at Michigan State College.

Yale Brozen, Assistant Professor of Economics, studied chemical engineering at Masachusetts Institute of Technology and was a member of the Senior Chemical Engineering Honor Group at that institution. He received his A.B. in Economics at the University of Chicago, served as an Assistant in Statistics, and was later appointed as Marshall Field Fellow in Economics at the University of Chicago. Following his work in Chicago, he served as Assistant Professor of Social Science at the University of Florida. Before joining the Illinois Institute of Technology faculty, he organized and superintended radio engineering and telephone engineering schools for the U. S. Army Signal Corps. He is a member of Phi Beta Kappa and the American Economic Association.

BALINT BROZEN CATON DAVIDSON

DEHN ENGLAND FRANKEL GAIL

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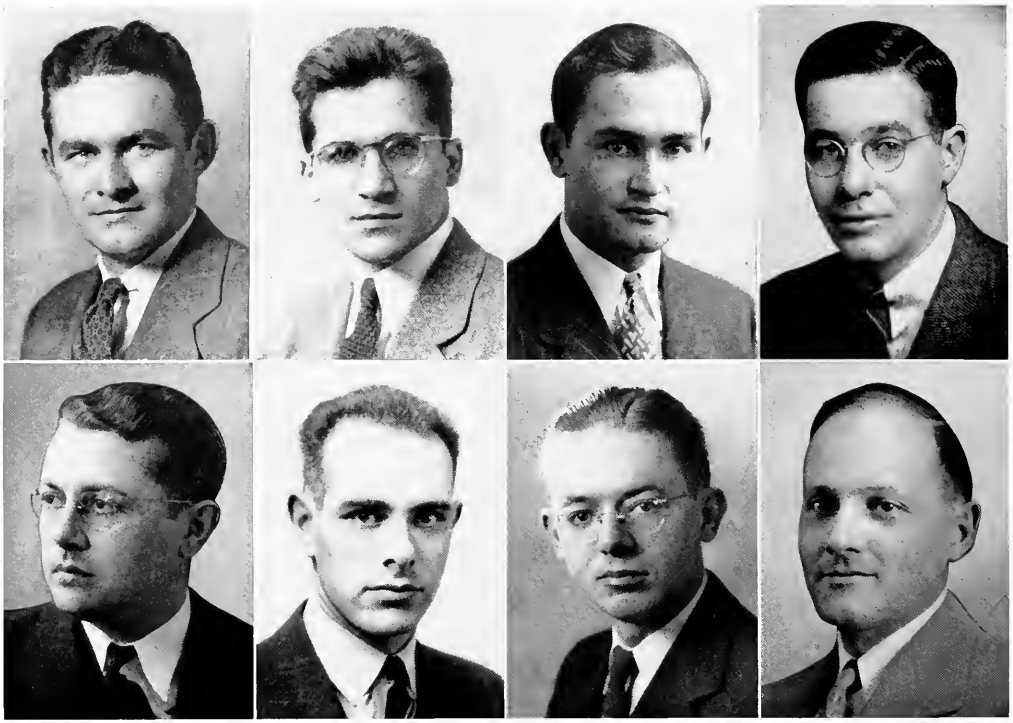


GIBSON HEINS HENRY HIGGINS
HILL LYMAN MACKEY MANNING

Willis B. Caton, Instructor in Mathematics, graduated from Washington and Jefferson College with the degree of B.S. He received his Ph.D. degree from Yale University. Dr. Caton has taught at Washington and Jefferson College, Athens College, and Southwestern College.

Norman R. Davidson, Instructor in Chemistry, received the B.S. degree at the University of Chicago, B.Sc. at Oxford University, and Ph.D. at Chicago. He has done post-doctoral research at the University of Michigan, and research for the Office of Scientific Research and Development at the University of Southern California, Columbia University, and the University of Chicago. Dr. Davidson's research interests are in molecular structure, with particular reference to the structures and reactions of inorganic substances.

Max W. Dehn, Visiting Lecturer in Mathematics, received his Ph.D. (summa cum laude) from the University of Goettingen. He taught as Assistant Instructor, Instructor, and Professor of Mathematics at the Institutes of Technology and Universities of Karlsruhe, Muenster, Kiel, Breslau, and Frankfort a.M. in Germany, and at the Norwegian Institute of Technology at Trondheim, Norway. From February 1941 to July 1942 he was Assistant Professor of Mathematics and Philosophy at the University of Idaho, Southern Branch, at Pocatello, Idaho.

Frederic E. England, Assistant Professor of Mechanical Engineering, is a graduate of the University of Mississippi; he has M.S. and Ph.D. degrees from the State University of Iowa. After a year as research engineer with the Aniline and Chemical Co., Buffalo, Dr. England was awarded an Arthur D. Little post-doctorate fellowship at Massachusetts Institute of Technology.

Alice Frankel, Assistant Librarian, is a graduate of Rosary College, where she received the A.B. degree. As a student, she was as a member of Torch and of Theotekeion honorary societies. For more than two years she was a cataloger at the Library of International Relations. Miss Frankel is a member of the American Library Association, the Special Library Association, and the Chicago Regional Catalogers and Classifiers Association.

Albert Gail, Assistant Professor of Mechanical Engineering, was born in Germany and came to the United States in 1937. He received the degree Diplom-Ingenieur from the Institute of Technology in Munich. From 1933 to 1936 he was head of the patent and research department of the Bavarian Aircraft Works, of Augsburg, and was engaged in the evaluation of international research publications for the preliminary design and development of the Messerschmitt airplanes. From 1937 to 1940 he was project engineer for United States Air Lines Flight Research, in charge of aerodynamic and vibration problems, and originated the method of dynamically balancing propellers which has been adopted by the major American air lines. Professor Gail has taught at Georgia School of Technology, the University of Minnesota, and the Uni-

versity of Michigan. He has written several articles on aeronautical design which have appeared in the technical journals, and is now preparing a textbook for undergraduate and graduate use.

George Gibson, Assistant Professor of Chemistry, holds the degrees of B.S., M.S., and Ph.D. in Chemistry from Brooklyn Polytechnic Institute. He has attended summer courses at Cornell University, and has taught at Brooklyn Polyteechnic Institute and at Elmhurst High School in New York City. Dr. Gibson has had industrial experience as a chemist with Chenco Products, Inc., and with Chas. Pfizer and Company, and has worked as research chemist and laboratory supervisor with the Knebs Pigment Division of E. I. Du Pont de Nemours, Inc. He is a member of the American Chemical Society, and of Phi Lambda Upsilon and Alpha Chi Rho fraternities.

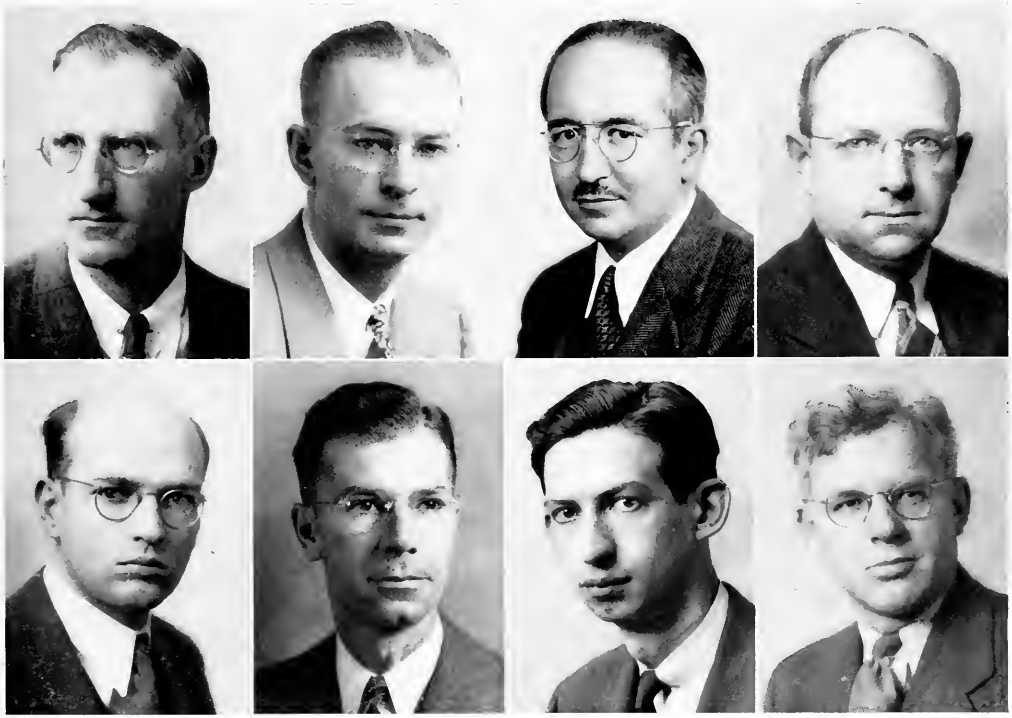
Maurice H. Heins, Assistant Professor of Mathematics, received his A.B. (summa cum laude), A.M., and Ph.D. degrees at Harvard University. He held a Henry Russell Shaw fellowship at Harvard; subsequently he was Instructor and Tutor at Harvard, and an Assistant at the Institute for Advanced Study. His special field is the theory of Riemann surfaces. Dr. Heins is a member of Phi Beta Kappa. Sigma Xi, the Mathematical Association of America, and the American Mathematical Society.

Herman L. Henry, Jr., Instructor in Technical Drawing, graduated from Louisiana Polytechnic Institute in 1940 with the degree of B.S. Subsequently, he has been at Illinois Institute of Technology as graduate student, part-time instructor, and full-time instructor in the summer sessions.

Thomas J. Higgins, Associate Professor of Electrical Engineering, received his E.E. and M.A. degrees at Cornell University, and the Ph.D. degree at Purdue. He has been plant engineer for Agfa Ansco Corporation, and has taught at Auburn Intercollegiate Institute, Wyomissing Polytechnic Institute, Purdue University, and Tulane University. Dr. Higgins' interests have included power transmission and distribution, network analysis, and electro-magnetic theory; applied mechanics; potential theory and applied mathematics; and the history of engineering and physics. He is the author of some thirty odd papers in various branches of engineering theory.

Ivan L. Hill, Assistant Professor of Technical Drawing, received his degree of B.S. in Industrial Arts from Iowa State College and has done graduate work in Industrial Education at the same institution. One year prior to receiving his B.S. degree, he joined the staff of Grove City College as Instructor in Engineering Drawing and Engineering Shop. He taught there five years before joining the staff of Illinois Institute of Technology.

MARTIN SCHULZ | MICHAELIS SIMONDS | MILLS STERNBERG | ROYS VINCENT



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WAGNER WEBB

Taylor Lyman, Instructor in Metallurgy, received his A.B. degree at Stanford University, and his M.S. at Harvard. He has taught at Columbia University, and has been employed by the Ford Motor Co., Hardy Metallurgical Co., and by the Army Engineer Corps.

George W. Mackey, Instructor in Mathematics, did his undergraduate work at Rice Institute, where he took his B.A. degree, majoring in physics. He has A.M. and Ph.D. degrees in mathematics at Harvard University. He has held a traveling fellowship from Harvard, and has studied at California Institute of Technology and at the Institute for Advanced Study. Dr. Mackey has taught at Harvard. He is a member of Phi Beta Kappa, associate member of Sigma Xi, and a member of the American Mathematical Society.

Melvin L. Manning, Associate Professor of Electrical Engineering, graduated from South Dakota State College. He received his M.S. degree and completed the required courses for a Ph.D. degree at the University of Pittsburgh. Mr. Manning has taught mathematics at the University of Pittsburgh, and was Westinghouse Lecturer in Electrical Engineering on the staff of the University. His ten years of experience in industry includes motor and generator design work, transformer design, and research engineering with the Westinghouse Electric and Manufacturing Company. From 1937 to 1942 he was supervisor of the high voltage laboratories (lightning stroke generators and surge testing) of the Transformer Division and was secretary of the Educational Committee of Westinghouse at Sharon, Pa. He is a member of the American Institute of Electrical Engineers (served as Chairman of the Sharon, Pa. section last year), Western Society of Engineers, Society for the Promotion of Engineering Education, Mathematical Association of America, and Sigma Tau.

Charles E. Martin, Instructor in Welding, did undergraduate work in electrical engineering at Worcester Polytechnic Institute, and received his bachelor's degree in Education at Hartford Seminary Foundation. For twelve years he taught at Billings Polytechnic Institute. During the academic year 1941-42 he attended Rensselaer Polytechnic Institute, taking various courses in the electrical, civil, and metallurgical departments, all relating to welding engineering. He is a member of the American Society for Metals and the American Welding Society.

A. C. Michaelis, Assistant Professor of Industrial Management, has the degree of B.S. in mechanical engineering from Northwestern University, the degree of M.S. in industrial marketing from the University of Arizona, and the degree of M.B.A. in industrial management from Northwestern. He has held a fellowship at Northwestern, and has taught in the School of Business Administration at Southern Methodist University, where he was in charge of E.S.M.W.T. courses in industrial management. Professor Michaelis has been a sales engineer for the Sullivan Machinery Co., and for S. C. Johnson & Son. He is a member of the American Management Association, and is faculty adviser of the Institute's branch of the Society for the Advancement of Management.

Peter J. Mills, Associate Professor of Physics and Director of the Parmly Foundation for Auditory Research, was graduated from Drexel Institute of Technology with the degree of B.S. in Engineering. He received the S.M. degree from the University of Chicago where his graduate work was done in Physics and Mathematics. He has been on the academic staff at the University of Chicago and at Thornton Junior College. At the latter institution he was for many years head of the departments of Mathematics and of Physics. He has done consulting work in sound systems and in the field of research laboratory instruments.

Carl S. Roys, Associate Professor of Electrical Engineering, graduated from the Worcester Polytechnic Institute and subsequently received the M.S. and Ph.D. degrees from Purdue University. His graduate program of study also included work at Union College and the University of Wisconsin. Before joining the staff of the Illinois Institute of Technology, he had taught civil engineering at Union College and electrical engineering at Purdue University. His industrial experience includes telephone transmitter development at the Bell Laboratories, general test and synchronous machine design at the General Electric Co. and cathode ray tube development in the R. C. A. Radiotron Division. Dr. Roys is a member of Sigma Xi, Tau Beta Pi, Eta Kappa Nu and Sigma Pi Sigma and is the author of several articles and bulletins. He obtained, in 1935, in cooperation with a former student, the basic patent on electronic switching circuits for showing two or more waves simultaneously on the cathode ray oscillograph.

R. Samuel, Visiting Professor of Physics, took his doctor's degree in Goettingen under Professor James Frank, now at the University of Chicago. For five years he held a research fellowship at the University and Technical College at Breslau. Subsequently he was Nizam Professor of Physics and head of the Physics department at the Muslim University at Aligarh, British India. In 1936, he joined the staff of the Hebrew Technical Institute at Haifa, Palestine, as Profesor of Molecular Physics and Physical Chemistry. Dr. Samuel was in America on a mission for his Institute, and was unable, on account of the Japanese war, to return to Palestine. He has published two monographs and more than fifty research papers on spectra and electronic structure of atoms and di- and

polyatomic molecules, on Raman spectra, photo-dissociation, and other problems connected with the theory of valency. He is a fellow of the Physical Society and of the Institute of Physics in London.

Elmer H. Schulz, Instructor in Electrical Engineering, received his B.S. and M.S. degrees at the University of Texas. He served four years as instructor and one year as assistant professor of electrical engineering at The University of Texas. He has also had experience in power transmisison and distribution work. Mr. Schulz is a member of Tau Beta Pi, an associate member of the American Institute of Electrical Engineers, and an associate member of the Institute of Radio Engineers.

Herbert A. Simon, Assistant Profesor of Political Science, received his A.B. and Ph.D. degrees at the University of Chicago. He has held research positions with the University of Chicago, the International City Managers Association, and the Bureau of Public Administration of the University of California. At the latter institution he directed a three-year program of studies in methods of measuring the services of local government. He has served as assistant editor of *Public Management* and *The Municipal Year Book,* is coauthor of *Measuring Municipal Activities* and several other monographs in the field of public administration, and has contributed frequently to periodicals in that field. He is a member of Phi Beta Kappa, and has been elected to affiliate membership in the International City Managers Association.

Rollin H. Simonds, Instructor in Economics, attended Harvard and Northwestern Universities, receiving B.S. and M.A. degrees from the latter institution. He has had three years of business and seven years of teaching experience. Until this year he taught at Maine Township Junior College in Park Ridge, Illinois.

He is a member of Phi Beta Kappa, Delta Sigma Rho, Phi Delta Kappa, and the American Economics Association. His special field of research has been in the analysis of price and credit problems. The direction of collegiate speech work and other professional speaking activities have been important side interests.

Elia Sternberg, Instructor in Engineering Mechanics, graduated with high honors from the University of North Carolina with the degree of B.C.E. He has held a scholarship at North Carolina, and a fellowship at Illinois Institute of Technology, and holds the M.S. degree in civil engineering from the Institute. He has worked as stress analyst for the Ambursen Engineering Co. Mr. Sternberg is a member of Tau Beta Pi, and an associate member of Sigma Xi.

Howard P. Vincent, Assistant Professor of English, received his B.A. degree at Oberlin College, and his M. A. and Ph.D. degrees at Harvard University. He held a Dexter Travelling Fellowship at Harvard. Dr. Vincent travelled in Europe in 1930, 1932, and 1937, and has done research in the public Record Office, London. He has taught at West Virginia University, and has been head of the department of English at Hillsdale College. He has published articles on literary history and biography, covering the period 1700-1836 in English and American journals—among them *Review of English Studies, Modern Language Notes,* and *Modern Language Review.*

Edward F. Wagner, Instructor in Chemistry, received his B.S. and M.S. degrees at Armour Institute of Technology. He has been chemical engineer for the Standard Oil Company of Ohio. Mr. Wagner is a member of Tau Beta Pi, Phi Lambda Upsilon, and Alpha Chi Sigma fraternities.

Henry J. Webb, Instructor in English, has his B.S. degree from New York University, and the M.A. and Ph.D. degrees from the University of Iowa. He has held scholarships and a research assistantship at Iowa, and has taught at that university, at the University of Utah, and at The Citadel. Dr. Webb's special fields of study have been the fourteenth, fifteenth, and sixteenth centuries, with special reference to criticism of the military profession in the literature.

STUDENT WAR COUNCIL

By
RAYMOND W. SMITH

Early this year a need was seen for a civilian defense organization at the Institute. The Illinois Tech Student Association, therefore, appointed a group of student leaders to form an organization to be known as the Student War Council. Its members were so chosen as to represent most of the activities at the school, so that instructions from the Council to students could easily be announced by these leaders in their respective organizations. The first meeting was held on February 4, 1942.

The council's first move was to get in touch with John F. Langdon, then Representative in Chicago of Youth Activities in the Chicago Area, and offer its cooperation in civilian defense activities in Chicago. Mr. Langdon responded by coming to Armour and Lewis on two successive Fridays to address the students. He emphasized the possibility of Chicago's being bombed from the air and tried to discourage a popular opinion that Chicago was too far removed from the war for its citizens to remain unconcerned.

One of the members of the Council was then placed in charge of the organization of a "Blood Bank" at Illinois Tech. This student arranged for a group of about twenty to go to the Red Cross headquarters almost every week throughout the spring semester.

At a special meeting of the Council with the treasurer and maintenance supervisor of the school, arrangements were made for the installation of an air raid alarm. Within the next week a new steam whistle had been installed on Main Building. The maintenance supervisor was instructed to arrange for the reception of alarms from Chicago's central alarm station. Another direct result of this meeting was the installation of a new paper towel saving device in all the washrooms of the Institute.

The Council carried on its activities during the summer in spite of the fact that only seniors and cooperative students were in attendance at school. Several new members were appointed

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BETTER MOUSE TRAPS

Today's machinery runs considerably faster than the machinery of grandfather's day. These increases in machine speed have necessitated the development of better apparatus and measuring techniques for the study and analysis of machine action. By the same token, these improvements in apparatus and techniques have resulted in faster, more efficient engine design.

In the earlier days, one of the most useful analyzing instruments consisted of an oscillating paper-covered cylinder, rotated by means of a string fastened to the cross-head of a steam engine, and a pen on the end of a stick moved up and down by variations in steam pressure within the cylinder. This served admirably to draw a pressure-volume indicator diagram of the reciprocating steam engines. A thorough analysis of the resultant "p-v" diagram revealed the innermost secrets of the engine. It indicated the efficiency, the timing of the various valves, the changes in pressure within the cylinder. It told whether the expansion and compression were adiabatic or isothermal, or at what point between these limits the machine was functioning. In short, it was a most valuable research tool.

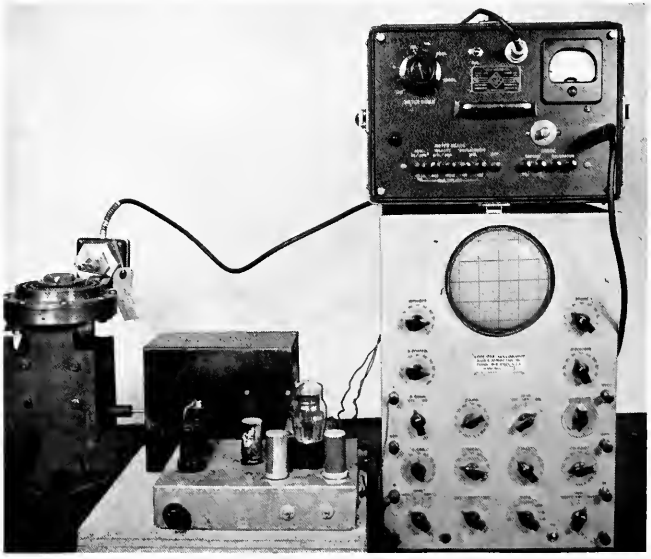
But along came the high-speed engine. Imagine how the paper-covered cylinder would dance and how the ink would splatter if the somewhat primitive, but still useful, apparatus described above were attached to a modern high speed compressor! The mechanical inertia of such a device would prevent proper recording of the rapid changes present.

Bear in mind that the "p-v" diagram is still one of the most useful of tools. If such a diagram is to be obtained on a high-speed machine, the obvious problem is to reduce or eliminate the inertia of the recording system.

The science of electronics has provided excellent tools. Of course, the obvious answer is in reducing the inertia by using the infinitesimal electron inertia in the cathode ray oscilloscope and photographing the fluorescent trace. There are at least four ways of transducing the rapid pressure changes in the high-speed engine to electrical waves proportional to pressure. They are by measuring potential changes across a carbon-pile resistor subjected to the pressure variation; by changing the capacity of a condenser (similar to the familiar condenser microphone); by using an electromagnetic pickup system; or by using the more recent piezo-electric crystal pressure pickup. The pressure pulse obtained by any of these methods must be amplified without distortion before being passed on to one set of the oscilloscope plates, usually the vertical deflection pair. But that is already standard practice in the automotive industry. The common practice, from this point on, has been to apply recurring sweep trace, linear with respect to time, on the set of horizontal deflecting plates. The resultant figure observed on the oscilloscope screen is a pressure - vs. - time curve. Since the volume vs. crank-angle is a function of time, it is possible to construct on rectangular coordinate paper the pressure - volume curve. This process is exceedingly laborious and open to obvious errors in construction.

In connection with a recent research problem, the Armour Research Foundation has developed a method of obtaining directly a true pressure-volume indicator diagram on an oscilloscope screen, which may then be either photographed or studied directly in a "fluid state" as changes in pressure, valve action, or speed of a machine are made.

Basically, the complete apparatus consists of a pressure pickup, a volume-sweep generator, an oscilloscope, and two special amplifiers. After several studies it was determined that



Set-up for obtaining electronically an indicator diagram of high speed machinery, including left to right: compressor, piezo electric pressure pickup, photoelectric sweep generator, "volume" amplifier, and cathode ray oscilloscope with "pressure" amplifier above.

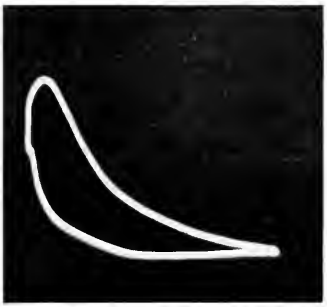
the piezo-electric crystal pressure pickup best suited the conditions of the research problem. This unit, which is commercially available, is connected to the cylinder chamber by means of a short length of flexible copper tubing. A special vacuum-tube amplifier with a negligible amount of phase shift is employed to amplify the output of the pressure pickup so that the signal generated can be fed directly to the cathode-ray-tube deflecting plates. This furnishes the pressure component of the diagram. This part of the entire apparatus is similar to many such units now in use, and is described in the literature.

But here is where the similarity to existing apparatus stops. The volume-sweep generator, while constructed of standard parts and operating on well known principles, is of novel design and application. A steady light source, falling on a photo-electric cell through an optical slit, is interrupted by an eccentrically rotating opaque disc. This disc is designed so that it alternately covers and uncovers the optical slit, thus varying the quantity of light falling on the photo-tube in direct proportion to the varying volume of the engine cylinder chamber. The shaft supporting this disc is directly coupled to the crankshaft of the engine under investigation and therefore turns at the same speed. The output of the photo cell is amplified by another special amplifier and fed directly to the other set of deflecting plates in the cathode ray tube. This furnishes the volume component of the diagram.

The phase between the various pieces of apparatus is then properly adjusted. The scale of the two components of the resultant indicator diagram may be changed to any desired value by adjusting the gain of the two amplifiers. In fact, with sufficient amplification, any small portion of the "p-v" diagram may be "blown up" and examined in detail by simply adjusting the centering and gain controls. This "enlarging" feature is only one of the advantages over purely mechanical means of obtaining such diagrams. Instantaneous changes, and changes caused by various adjustments of the mechanical parts of the engine while in operation, are easily observed on the oscilloscope screen. Photographing the trace through a rectangular coordinate index grid fastened over the cathode ray tube yields a negative which can be analyzed directly without any laborious plotting, a distinct advantage when analysis of many curves is necessary.

R. J. TINKHAM.

Facsimile of rotating disc.



Typical indicator diagram. Volume plotted on abcissa, pressure on ordinate.

THE SCHOOLMASTER

One of my colleagues, who is also one of my best friends and a regular contributor to the ENGINEER, has a good article in the November number of ESQUIRE. John Schommer titles his story "Where's That Goat," and tells us in his own picturesque language what it feels like to be a football official. No one has better qualifications to write such a story. An outstanding athlete at Chicago in his undergraduate days—perhaps the best-known umpire in intercollegiate football—now an official in professional football——John has the experience, the temperament, and the style to tell us about the curious combination of sportsmanship and attempts at mayhem that we call football.

An engineer likes to write a specification. In his capacity as an engineer, John gives us a specification for a football official. "Good physical condition, . . . alert eyes, thorough knowledge of the rules, courage, and personality." Let's judge him by his own standard. Check, John. And double check.

I told John that I was going to comment on his ESQUIRE story, and that I might take a few shots at him. He was pleased, because that would give him a chance to shoot back at me. That made the thing a game, and he likes games.

This is not a review of the goat article. Read that for yourself, and enjoy it. I am merely jotting down my impressions of the author, as he depicts himself in his writing, and as his writing recalls to my mind many incidents in our years of close association.

Schommer is a chemist and a chemical engineer. He has no doctor's degree, but I surmise that if he had observed all the requirements of selection and sequence in the numerous courses he has taken in college and university he could write Ph.D. after his name. At the Institute he teaches industrial chemistry, is in charge of physical education, and is director of placement.

He seems to know everybody; at any rate practically everybody knows him. People like him, even when they disagree with him. My ideas and his are far apart on many things, ranging from football to economics. Probably he does not know nor care anything about that divergence of ideas. Nobody who talks with him ever has any doubts about John's own opinions. He has no false ideas of reticence, and not many inhibitions in his choice of words. What he says he means, and no fooling. A square shooter.

John Schommer is a schoolmaster of an unusual kind. A faculty made up entirely of Schommers would be lots of fun; there would be plenty of excitement. I should not like to be the sole representative of the more conventional kind of schoolmaster in such a group. But one Schommer is good for us, good for our students, good for the school. Long may he wave.

WHAT ARE WE GOING TO DO TO WIN THE WAR?

By

BENSON JEWELL

Before speaking of what we are going to do to help win the war, I, on behalf of the graduating class, first wish to thank the officers of the Illinois Institute of Technology, and our instructors during the past twelve weeks, for the knowledge and inspiration they have given us. Certainly, in anything we do to help win the war we will be using the equipment with which they have furnished us.

I have mentioned helping to win the war. It would seem obvious that what we are going to do to help win the war is inspect ordnance material.

In order to understand clearly what inspection means, in essence, and as applied to battle equipment, let us imagine a prehistoric council rock. Gathered about it are the first creatures distinguishable to history as man. We can imagine the primitive nature of these men—in our mind's eye they appear almost as animals—yet they are actuated by the same instinct of self preservation that actuates men today. A messenger arrives at the rock with the news that from the steaming jungle an enemy is approaching. Their very existence is menaced and to defend this existence they must fight. Being men, they need weapons. Being primitive men, their weapons will be clubs that they find or fashion in the forest, or stones that they find in the brook. Let us follow one of these creatures as he gets ready for the fight. We see him stoop as he comes to the brook. Here begins inspection. He rejects several stones before he finds a number which are of the right weight, smooth, and of the right shape—in other words, weapons that pass his inspection. Later he chooses a club—he inspects it for weight, for length, for strength, for the gripping properties of the end he proposes to use as a handle. He tries several before he makes his final choice. And we notice in this man's actions an extreme care, an anxious searching for the right weapon. He is not haphazard, because his very life depends upon how well he chooses his weapon. It is easy to imagine that in this tribe there is one who is more expert than the others in his choice of weapons—his inspection is more critical and more expert. And we can imagine further that the other members of the tribe offer to fish for him or pay him in some other way, if he will but choose weapons for them. From the very beginning we see inspection has been as essential of battle activity. If our primitive man did not pick his club well, it failed him at the critical moment, and his destruction was immediate—his inspection was a life factor. It is of no less importance today.

We are all familiar with the development of battle equipment during the ages. Today the fighting man, a man from here at home whom we know, in the heat of battle takes up a shell. He has no gages, and it would be death for him to take time to use them if he had. Obviously then, he has no way of knowing whether the shell is good until he slams it home and the gun is fired. Inspection is his reason for being confident that the shell will fire. He stakes his life on it. Here again we see that inspection is a life factor. The difference is that this friend of ours did not inspect his own weapon—the shell that now stands between him and death. One of us inspected it. If it fails him it is because one of us failed him. Repeat this picture for the many other types of battle equipment, and we begin to see the appalling proportions of our responsibilities. Each piece of equipment assumes a destiny. At some fateful moment it will stand in the balance, a factor small but positive. It will no longer be neutral, just one of millions like it, but will have a definite effect on the battle, one way or the other. If it is good, it will aid our victory and mean death to the enemy. If it is bad, it will aid our enemy against our victory, and it will mean death to one or many of our boys. If it is bad, how did it get to the scene of action? A careless moment at the inspection table? If that one of us who was guilty of that careless moment could see its result, would he ever forgive himself? Because the result is far from us can we feel any less guilty if we indulge in a careless moment? Death rides our plug gage, and every time that a bad part is permitted to go through because of careless inspection, Death will write the name of one of our boys on it. He may write many names on it. If the careless inspector could read that writing, he might to his horror recognize some of the names—but he cannot read it, and he will never know.

The inspection we have been talking about, however, is necessary if we are to but continue the war. Our question is, on the other hand, "What are we going to do to help *WIN* the war?" We must remember that the enemy has inspectors too, and that the enemy's inspectors are certainly as good as ours—if ours are average. There are certain things required of any inspector, anywhere—promptness on the job, compliance with the orders of one's superiors, a job well done—but after all, these are minimum things which any average inspector will do. They are necessary if we are even to help continue the war, to just keep even with the enemy! If we are to help *WIN* the war, we must have inspection as good as the enemy's *PLUS!* A plus job must be done. We must help create the plus margin that means victory—a margin that will be very small, as the margin that means

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HELP!

HELP!

HELP!

There is a bull market in engineers. From a "dime a dozen" in 1933 and 34, the market has skyrocketed because there are vast numbers of "bids" but few "offers." Fancy prices are being paid for "gilt-edged" men — "blue chips." The ticker is running wild with bids of all sorts but there are far too few "offers" to slow down the surging demands. So we are witnessing one of the most frantic bull markets ever seen. There seems to be a "corner" in the market on engineers. Some "big shots," the governmental laboratories, the armed services and industry are openly accused of creating a false market. But the "bears" are alleged by the "big three" to have deliberately curtailed their product to bring on fancy prices.

Large offerings, of those qualified by special defense training courses, have been thrown on the market to stem the tide but they haven't even made a dent in the prodigious demands for qualified engineers.

It is rumored that the "curb" will flood the market in 1943 with a vast number of trained women. It is alleged by those in "the know" that this gesture will not affect the "blue chips" but it may hit hard the less seasoned engineers of military age— especially those between nineteen and thirty years of age.

Reports are coming into the Placement Office from various parts of the country that civil service jobs of all kinds held by men of military age are or will be filled by women or by older men if they can be found. Since there are not enough qualified engineers, by the tens of thousands, for industry, perhaps it is time for you alumni holding civil service jobs, and others, in the draft age, to look around. Find out if you are needed as a "necessary man" in a "critical occupation" and therefore needed urgently enough to have your deferment fought for or if civil service regulations are such that you may resign without stain on your rating and be permitted to enter the armed services with an officer's commission, or go to a defense industry to aid production, before your draft board blows its hot breath on the back of your neck.

If you are married and have children or none, or if you are single with secondary dependents and you are in the draft age, you may be assured with the size of the armed forces contemplated you are very likely to be called unless you are a "necessary man" in a "critical occupation."

Let us look at the picture. There are approximately 32,000,000 men in the draft age of eighteen to forty-five. This includes all males—the weak-minded, the physically disabled, the blind, deaf, those in jail and asylums and the sick with incurable diseases. Deduct from this all those that are unfit for combatant duty, all "necessary men" in "critical occupations," all men elected to national and state public office, physicians, dentists and many others, who, because of special skill, are needed in the armed forces for duty other than fighting. The figure of 32,000,000 is whittled down. The men from thirty-five to forty-five years of age have not stood the gaff of intensive drill, physical exercises, long marches and army life. Many of them have broken down with hernias, nervous disorders, heart ailments, and other afflictions. This latter picture makes it appear that the brunt of the fighting will be done by those in the brackets of about nineteen to thirty-five years of age.

So your duty is to take stock of your intelligence and experience and figure out where you may best serve your country. You are college-graduated engineers with four years of difficult work in the basic sciences and their practical application in many fields of engineering. You have had from a few months training in industry to many years. Where do you belong?

Defense industries, research laboratories, and the armed services need urgently your engineering brains and experience.

Production in many plants is scheduled to be doubled in 1943. There will be many new plants erected. Research laboratories are being enlarged and new ones are being created. As the armed forces are increased, the need for commissioned officers swells.

Last year out of 13,000 engineers taking their degrees in the United States, it is estimated that fifty-one per cent are in the service. This year 13,500 engineers may take their degrees; sixty per cent of this number will join the service. This allows about 5,400 graduate engineers of the 1943 class for industry.

About 150 letters were sent by the Placement Department to those industrial plants that have always favored us with their engineering job opportunities, to ascertain their most conservative estimate of their requirements from the engineering graduates of 1943. The answers from these plants are not all in at this writing, but four of the largest requests for engineers of all branches were as follows; 1780, 1250, 1000 and 600. Many requests for 50 to 250 engineers also have been received.

The armed forces are urgently in need of officer material. The requests are for men from thirty to fifty-nine years of age. Younger men are wanted for the V-7 and V-1 classifications in the Navy. The older men are wanted for all sort of construction projects.

The Marines wish to interview the following: Electrical, mechanical, civil, architectural engineers, and landscapers, men trained in radio and communications, meteorologists, Diesel engineers, and air-port engineers. The age limit is thirty-two to forty-four years.

The Chemical Warfare Service wants candidates for that service over thirty years of age, up to fifty-nine years. They also want men with master's and doctor's degrees who have majored in chemistry or engineering.

The Flying Corps wants men for ground service.

The Army wants men urgently for the communications fields, to use in the signal corps.

Remember, for officers' commissions, you must pass physical examinations and eye tests. You must prove citizen-

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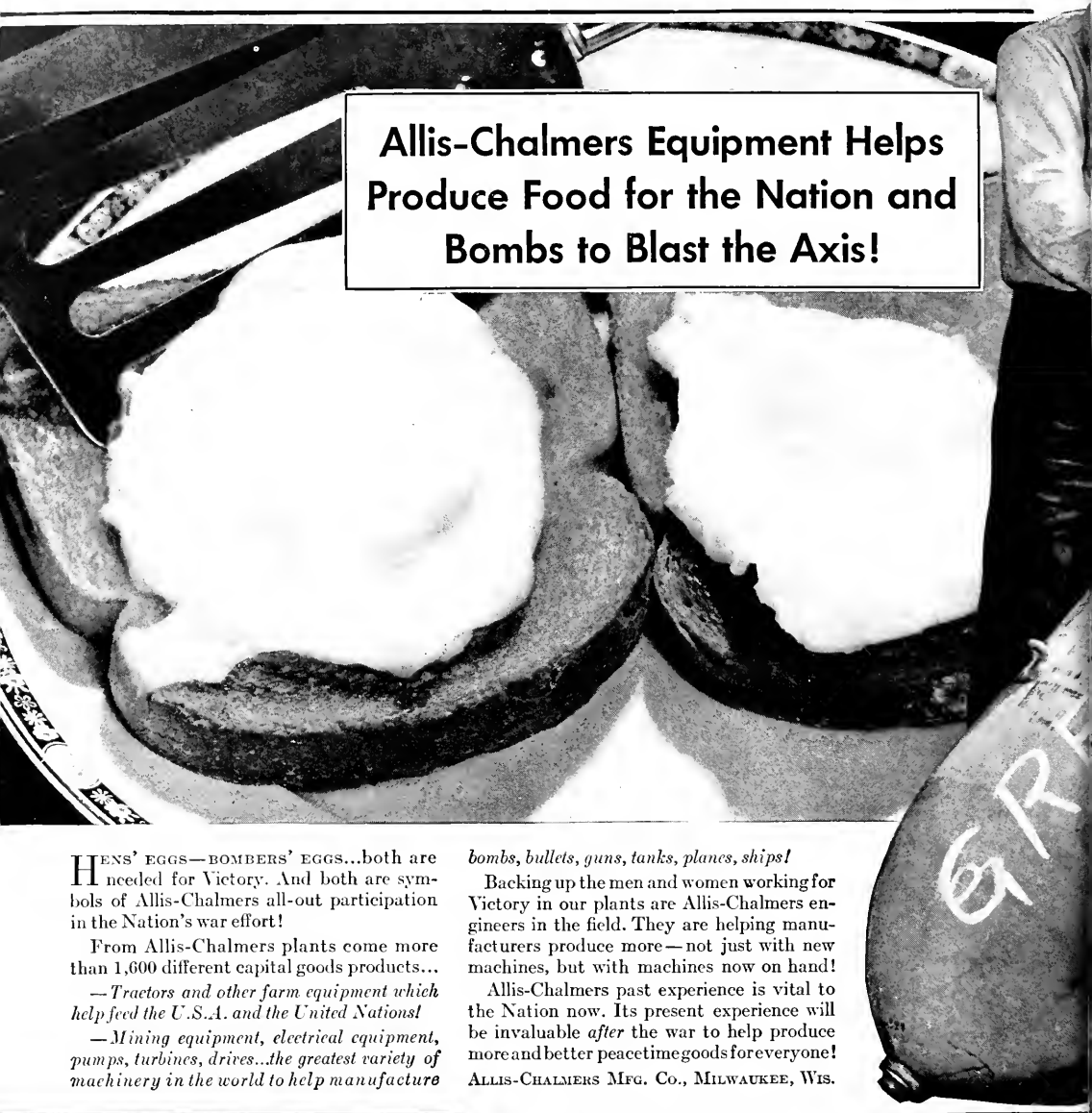
EGGS...ON TOAST OR



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VICTORY NEWS

Rosiclare, Ill.—91 Allis-Chalmers motors constitute the major portion of a connected load of close to 1,000 hp driving the new fluorspar mill of the Mahoning Mining Company here.

The efficient layout of flexible motors and drives is largely responsible for the plant's record production of high-grade fluorspar zinc-lead ore. Throughout the mill, the Allis-Chalmers motors operate dump hoppers, flotation cells, vibrators, kilns, pumps and many other machines.

"We're Buying and Building," an A-C workman tells MGM bond rally starlets, as he machines a Navy propeller shaft.

Milwaukee, Wis.—The "feed-back" system, which utilizes 85% of the enormous power expended in breaking in aircraft engines on test stands, has been adopted by Buick in its new plant in a mid-western city.

The new engines are connected by flexible shaft couplings to water-cooled magnetic couplings, which transmit power to 1200 kva synchronous generators.

Allis-Chalmers alternating current units are at work here. They not only help to crank the new engines, but they also operate as current absorption-type dynamometers—receiving power from the aircraft engine, turning it into electrical energy and feeding it back into the line. This test set-up provides a high percentage of the power required by this company's manufacturing operations.

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THE BOOK SHELF

Isomerization of Pure Hydrocarbons, by Gustav Egloff, George Hulla, and V. I. Komarewsky. Reinhold Publishing Corporation, 1942.

Gasolines made up of straight chain compounds (carbon skeleton: C-C-C-C-C-C-C-C) such as normal octane are among the world's worst "knockers" in high compression engines. Their knocking can be removed by one of two methods which are widely used at present: (1) the addition of some agent (lead tetra-ethyl) to soften the blow of the explosion against the engine, or (2) the rearrangement of the atoms in the molecule by use of catalysts and of definite conditions to produce molecules of the same mass but having the carbon atoms in branched chains; e.g., C-C-C-C-C-C.
C C

This latter process is discussed thoroughly in the new monograph by Gustav Egloff, George Hulla, and V. I. Komarewsky.

Isomerization of hydrocarbons as a phenomenon has been known for a long time, but only recently has industrial recognition been given it. The future will see it become increasingly important, not only in the petroleum industry but elsewhere. The authors point out (p. 19) that "When the German air force tried to invade England in September, 1940, they were stopped by the R.A.F. who were using 100 octane gasoline in their motors, whereas Germany used 87. The 100 octane gasoline gave the English superior speed and maneuverability. The isomerization reaction played a role in the quality of the gasoline used." The National Defense program of the United States calls for the isomerization of all available normal butane (carbons arranged C-C-C-C) and normal pentane to obtain iso-compounds (branched chains) for aviation gasoline.

One company reports that a process in which isomerization is used increases the octane number of straight run gasoline from 65 to around 81, with 98 per cent yield. This means that a given amount of synthetic hydrocarbons can be used to prepare an additional 62.5 per cent of aviation gasoline.

Although the isomerization of petroleum hydrocarbons has been treated exhaustively in this monograph, the behavior of other hydrocarbons has in no way been neglected, as can be seen from the following list of chapter titles: 1. Alkanes (30 pages); 2. Alkenes, Alkadienes, and Alkapolyenes (30 pages); 3. Alkynes, Alkadiynes, and Alkapolyynes (10 pages); 4. Cyclanes, Spiranes, Bicyclanes, and Polycyclanes (33 pages); 5. Cyclenes, Bicyclenes, and Polycyclenes (27 pages); and 6. Aromatic Hydrocarbons (63 pages). Each section of each chapter closes with a few statements which serve to generalize the reactions and mechanisms of that particular class of hydrocarbon.

Especially noteworthy is a comprehensive table of Isomerization Data (180 pages) for various specific hydrocarbons, in which are given the reactants, the conditions, the products, yields, and references. The Appendices contain detailed information on patents covering isomerization processes, extended translations of a Russian article and a German thesis on iso-alkane determination, and a digest of the most recently published material on isomerization which serves to bring the monograph complete up to Feb. 1, 1942. A bibliography of more than 800 references and an author index will prove exceedingly helpful to those researching in this field.

This book is No. 88 in the well-known Monograph Series of the American Chemical Society. It, like others of the series, speaks with authority and completeness. A more timely book for the chemical profession could hardly have been made available.

M. J. Murray

Engineering Mechanics, a textbook for engineering students, by B. B. Low, Lecturer in Mechanical Engineering, Military College of Science. Longmans, Green and Co.

Engineering Mechanics has been very popular in this country as a textbook title. Any teacher of Mechanics in an American engineering school could name several works bearing this name, each covering the two elementary subjects known as Statics and Dynamics. Quite different is this English textbook. Commencing with a discussion of velocity and acceleration, the author goes very rapidly through velocity diagrams and acceleration diagrams, subject matter usually treated in courses in Mechanism in American schools. One short chapter is then given to Dynamics of a Particle, beginning with Newton's Laws of Motion and including Momentum and Energy methods. Next is a chapter on Dimensions and Dynamical Similarity, a topic slow to find its way into American books on Mechanics. A chapter is devoted to Simple Harmonic Motion, which is introduced as the diametral projection of a point moving in a circular path with constant speed. Then follows a chapter on cams of the types used for operating the valves in internal combustion engines. The motion of rigid bodies is discussed briefly, with problems solved by the use of D'Alembert's Principle, Work and Energy, and Impulse and Momentum. There is a very meaty chapter on Vibrations, in which the author includes torsional and flexural vibrations as well as whirling of shafts. The last chapter, on Deflections of Beams, uses the Double-Integration method. Here is presented the Macaulay method for obtaining deflections when the load is not continuous, a method of grouping terms and performing integrations which eliminates some of the work of finding constants of integration.

The author ranges widely through the field of Engineering Mechanics in this book. Topics, for example Vibrations, are included which in this country would be given in a separate course and at a later point in the curriculum. Most of the material is presented in such brief form that difficulties are likely to be encountered by the beginner. Problems are grouped at the ends of the chapters, easy ones first, followed by harder ones. One can imagine the student reading through a chapter rapidly, slowing at the beginning of the list of problems and stalling completely on those at the end.

The book has an English flavor in its respect for tradition and terminology. As examples might be cited the quoting of "Routh's Rule," which appears in few American books, and the reference to a plate supported by two strings as Bifilar Suspension.

Three generations of one family are represented in this volume. It was undertaken at the suggestion of the author's father, the late D. A. Low, Emeritus Professor of Civil and Mechanical Engineering, East London College, and is intended as a companion volume to the latter's *Applied*

(Turn to page 45)

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FROM YEAR TO YEAR

A RECORD OF OUR ALUMNI AROUND THE WORLD

MAN OF THE MONTH

One of the most distinguished alumni of Lewis Institute of Arts and Sciences of Illinois Institute of Technology is Albert W. Hawkes who, on November 3, 1942, was elected Senator from the State of New Jersey.

Albert Hawkes was born in Chicago, on November 20, 1878, of parents of moderate means and grew up in a modest home. He attended Chicago public schools until the age of fifteen, when he became employed as an office boy. Prior to this employment, at ten years of age, he had sold newspapers at the Dempster Street Station of the North Western Railroad in Evanston.

Mr. Hawkes, while employed during the daytime, studied law at night at the Chicago College of Law from which he received the LL.B. degree. He was admitted to the state bar when he was twenty-one years of age. At thirty-five he began studying chemistry at Lewis Institute night school and completed his course in 1915.

During his business career, Albert Hawkes has worked for several companies, among which are the General Chemical Company, of which he was director of sales from 1916 to 1918, and vice-president from 1923 to 1926. He was vice-president of Wing and Evans, sales agent for the Solvay Process Company, from 1921 to 1927. He was associated with the Nichols Chemical Company, General Chemical Company, and Allied Chemical and Dye Corporation for thirty-two years —from 1894 to 1926.

From 1926 until he recently became United States Senator from New Jersey, Mr. Hawkes was president of Congoleum-Nairn Incorporated; he

Photo—Blank & Stoller

SENATOR HAWKES

became chairman of the board in 1937.

During his business career he has further served as president of Bonded Floors Company; Congoleum Canada, Limited; and Maryland Felt and Paper Company. He is director and member of the Executive Committee of Technicolor, Incorporated; director of Michael Nairn and Greenwich, Limited (London) and Technicolor Motion Picture Corporation; and is a member of the New Jersey State Labor Mediation Board. He is chairman of the New Jersey Committee for the sale of Defense Bonds and Stamps; a member of the Advisory Council for National Defense, Trenton, New Jersey; and is also Honorary Chairman of British War Relief Society, Incorporated, Montclair Committee.

During his civic career he has been president of the United States Chamber of Commerce; director and member of the Executive Committee of the New Jersey State Chamber of Commerce; member of the New York State Chamber of Commerce; member of the New Jersey Sons of the American Revolution; and member of the National Aeronautical Association. He has served on the Newark Labor Relations Board and the New Jersey State Labor Board, and he resigned from the National War Labor Board, to which he was appointed last June by President Roosevelt, to enter the senatorial race.

Among the clubs in which he holds membership are the Union League Club; National Arts Economic Club; Kiwanis Club of New York; Metropolitan Club of Washington; Blind Brook Club of Port Chester, New York; Montclair Club of New Jersey; Essex Club, Newark; and Matigouche Fish and Game Club of Canada.

At a recent luncheon meeting at the Chicago Club Mr. Hawkes declared that the great gulf between the American and the totalitarian way of life must be maintained. He said, "I have the definite conviction that you can't win the war with a physical victory over Germany and Japan. Victory for the United States in the war is so interwoven with preservation of the fundamental principles of our American system of free men under the Constitution that the two things cannot be separated. The Republican party thru its victory has a great obligation to the American people and it must be performed with vision and in such a way as to hold the faith of the mass of American people found in between extremes of right and left."

Typical of Albert R. Hawkes is his addition to his sketch in *Who's Who in America* which reads, "Interested in preserving the form of government of the United States and making known the truth about individual rights and the American free enterprise system."

Mr. Hawkes is a student of Abraham Lincoln and has distributed thousands of copies of excerpts from Lincoln's speeches.

He is a director of "Mobilization for Spiritual Ideals," and is an active Episcopalian.

On May 15, 1901 he married Frances Olive Whitfield.

Mr. and Mrs. Hawkes live in Montclair, New Jersey. They have a daughter, Mrs. Morgan G. Padelford of Pasadena, California, and a son, Major A. Whitfield Hawkes of the Army Medical Corps.

HOWARD A. CARTER.

1923

Piety, Harold M., E.E. A., is a Lieutenant with the Bureau of Naval Personnel, Arlington Annex, Room 3706, Washington, D. C.

1924

C. C. Applanalp, M.E. A'25, who is district manager for Wallace & Tiernan Company, Inc., 809 W. Washington Boulevard, Chicago, writes that Herbert K. Murner, C.E. A'24, is in charge of the Portland, Oregon, Ship Building Yard for the Kaiser Company.

1927

Capouch, Charles, E.E. A., who is a rate-setter for the Western Electric Company, Hawthorne Works, Cicero, Illinois, has recently changed his address to 2109 Clinton Avenue, Berwyn, Illinois.

1931

Woo, Chung W., A.S., L., recently wrote to the Alumni Office as follows:

Dear Sir:

I have been receiving the *Technometer* regularly, and thanks to your untiring efforts I am informed of the Alma Mater's activities and news through that medium. To tell you the truth, I suppose I am the only person, now in Canada, who is in a position to let you know of the whereabouts of most of the Chinese alumni from Lewis Institute in China. In 1933, with over thirty Chinese graduates from Lewis, we formed a club in Canton called the Lewis Club of Canton. We held monthly meetings at the famous Euro-American Club Building in Canton and held lively discussions over current matters. Our main object was to foster good-will among the clubs of other universities formed by other Chinese alumni.

We had the usual officers, and two years before the occupation of Canton by the enemy I was elected permanent English Secretary of our club. I was unfortunate enough to lose most of my belongings during the hurried evacuation and therefore some of the club's records, although I have all the addresses of our members intact.

To write you the story of my return to Canada is a very long and sad story. I had been in Southern Kwangtung and Kwangsi Provinces during my first two years in China, doing engineering work, then I was with the Canton Municipal P.W.D. as assistant engineer on designs of street and highways, latterly checking reinforced concrete work on all construction work in the city. A friend and I opened an architectural and engineering office in Hong Kong, where we built several fine residences.

My present reason in writing is in connection with your request in the October issue of the *Technometer* headlined "Where Are They?" Mr. William Noon Wong (Chinese name Wong Shek Noon) E.E. L'34, happens to be a personal friend of mine. I am happy to write that he is now Chief Radio Engineer of Station XPRA at Kunming, near Chungking. At present his family is staying with him there, but conditions of war have made it very trying for him. I would like to comment more in detail on his work but time and space do not permit. I will try to write more next time. Should you wish to know of the whereabouts of other Chinese alumni, I shall be glad to furnish you with all the information at my disposal.

Yours very sincerely,
(Signed) Chung W. Woo.

1933

Devin, Sydney L., A.S., L., is now serving in the Army. His address is: Corporal S. L. Devin, ASN, 36017761, Service Company, 129th Infantry, A.P.O. No. 37, c/o Postmaster, San Francisco, California. Corporal Devin would appreciate hearing from his friends.

1934

Chadwick, Donald N., E.E. A., is employed as engineer for the Dallas Power & Light Company, Dallas, Texas. He resides at 710 Newell Avenue, Dallas.

Ferri, Dr. Nicholas A., A.S. L., is now 1st Lieutenant with the 25th Evacuation Hospital Unit from West Suburban Hospital, Chicago, Illinois. His present address is A.S.N. O-468-635, A.P.O. 3195, c/o Postmaster, San Francisco, California.

Ferri, Mrs. Nicholas A. (Florabeth Hooper) A.S. L., now a Third Officer in the Women's Auxiliary Army Corps, may be reached at Barracks 63, Army Post Branch, Des Moines, Iowa.

Teacherson, Andrew G., E.E. L., is a lieutenant with the United States Naval Reserve. His mailing address is Extra Yard Planning Sub-Div., Naval Operating Base, Norfolk, Virginia.

1935

Christoph, Albert E., M.E. A., is employed as General Foreman of Production by the United States Cartridge Company, St. Louis, Missouri. He resides at 7329 Burrwood Drive, Normandy, Missouri.

McDougal, Lemuel G., E.S. A., widely known Negro architectural engineer, according to a news release from The Chicago Housing Authority, has been appointed chief superintendent for the Associated Housing Architects in construction of the $4,840,000 Robert H. Brooks Homes, 834-unit public war-housing project at Fourteenth Street and Racine Avenue, Chicago. After serving with the 370th Infantry in France during World War I, McDougal became associated with Henry K. Holsman, nationally known architect. The South Park Housing Architects retained him in 1939 as senior structural designing engineer for the 1,662-unit Ida B. Wells Homes, Pershing Road and South Parkway. He later became assistant superintendent of the project and of construction of the Frances Cabrini Homes, Chicago and Hudson Avenues, Chicago, Illinois. Mr. McDougal resides at 5851 S. Wabash Avenue, Chicago.

1936

Chapman, Gerard, Sci. A., who is Junior Technical Assistant for the Wood Conversion Company, Cloquet, Minnesota, lives at 305 Avenue C, Cloquet.

Currier, Milton G., E.E. L., writes that since June 1, 1942, he has been employed by the Bell Telephone Laboratories, 463 West Street, New York. His residence address is 34 Hill Street, Apt. 308, Morristown, New Jersey, and his mailing address is P. O. Box 412, Morristown.

Rieves, Marshall H., E.E. L., holds the rank of Lieutenant (J.g.) in the United States Naval Reserve.

1937

1st Lieutenant Aarmon S. Cahan, A.S. L., who was commissioned in August of this year in Chicago, has been assigned to the Medical Battalion of an Armored Division at Camp Polk, Louisiana.

Disenhaus, Nathan, E.E. A., who is a 2nd Lieutenant in the Signal Corps, writes as follows:

Dear Sir:

Just to bring your records up to date: I meet our alumni everywhere. A few of them are in the Washington Signal Office, in civies and in uniform. Hope we can all have a reunion after this affair is over.

Lieutenant Disenhaus' residence address is Army-Santander Apartments, Asbury Park, New Jersey.

Hlousek, Joseph, M.E. A., is a draftsman and designer for the Onsrud Machine Works, 3900 W. Palmer Street, Chicago, Illinois. He resides at 6242 S. Whipple Street, Chicago.

Markoutsas, George C., A.S. L., is a 1st Lieutenant in the United States Army Medical Corps located at Camp Carson, Colorado. His home address is 1608 W. Cermak Road, Chicago, Illinois.

Sullivan, Frank E., A.S. L., recently was promoted from captain to the rank of major. Major Sullivan is now commanding officer of the 860th School Squadron at Goodfellow Field, San Angelo, Texas.

1938

Major Thomas P. Gerrity, S.S. A'38, was reunited with his wife, Margaret, and their 16-months-old son, Tom Jr. last Thursday in the home of his parents at 7838 Escanaba, Chicago, Illinois, after an absence of more than a year from home. A veteran pilot of more than sixty bombing missions, he has seen action in the Philippines and Australia. His thrilling story of heroism and courage during the defense of Bataan appeared in *The Chicago Times* last June.

"In the early stages of the war we sometimes went months without coffee," Maj. Gerrity said. "The boys are making every sacrifice demanded without grumbling and their appeal to the folks at home is that no sacrifice is too great to keep democracy safe."

As a Lieutenant, Maj. Gerrity fought through most of the Philippine war in the air if he could find a plane, in trenches and foxholes if he couldn't. Weeks before the fall of Bataan he acted as unofficial aide to Gen. Jonathan Wainwright, who was later captured with his men by the Japanese. Maj. Gerrity was rescued with other airmen after the fall of Bataan by a group of American bombers which flew them to Australia. He received his promotion to the rank of Major two months ago.

Rome, Samuel C., A.S. L., is an Ensign in the United States Navy. His home address is 5518 N. Winthrop Avenue, Chicago, Illinois.

1939

Anthon, Harold S., C.E. A., has been commissioned as a Lieutenant in the U. S. Army. His new address is care Weather Office, Portland Army Air Base, Oregon.

Young, David A., A.S. L., a Private in the United States Army, may be reached at Bty. 22, O.C.D., A.A.S., Camp Davis, N. C.

1940

Bigos, Casimir L., Ch.E. A., was promoted from Ensign to Lieutenant (J.g.) in the United States Navy. He recently wrote to the Alumni Office as follows:

"Dear Sir:

"After quite a while the *Technometer* reached me out here, which must be called 'on the Atlantic'. There are two things sacred in the Navy—one is liberty, and the other letters and news of friends. So you see that your sending the *Technometer* to men in the Navy is highly appreciated.

"Things happened so fast that I didn't expect you to have my latest rank, which is Lieutenant (J. g.). Another thing that happened to me was the bout I lost to Cupid. I'm engaged to Christine W. Buysmann, of the Bureau of Ordnance, Navy Dept., Washington, D. C. So it's a nautical affair throughout. Will be married the first chance we get to do things properly.

"Am interested in getting at least a card from my various friends. That's about all I can promise to anyone. I can't say a thing about my work, but it's new and important and interesting.

(Signed) Casimir L. Bigos, Ch.E.'40,
Lieutenant (J.g.)
U.S.S. Hugh L. Scott,
Care Postmaster,
New York City, New York."

Caldwell, William M., E.Sc. A., has recently moved to 16 East 153rd Street, Harvey, Illinois. He is a Metallurgical Observer with the Carnegie-Illinois Steel Corporation in Gary, Indiana.

Finn, Harry G., A.S. L., a private in the United States Army, wrote the Alumni Office that since his induction on June 19, 1942, he has been stationed at five different camps. He is now stationed at A.A.F. Detachment, Southwestern Proving Ground, Hope, Arkansas.

Hogan, Stephan, Jr., A.S. L., a Lieutenant in the United States Navy, received the Navy Cross in Pearl Harbor from Adm. Nimitz for conspicuous bravery during the battle of the Coral Sea. Lieutenant Hogan, who piloted a carrier-based dive-bomber in the Coral Sea action, received his preliminary training at Pensacola, Florida.

Pasiuk, Theodore, A. A., is now an Aviation Cadet.

Chicago Times Photo

MAJOR GERRITY AND HIS FAMILY

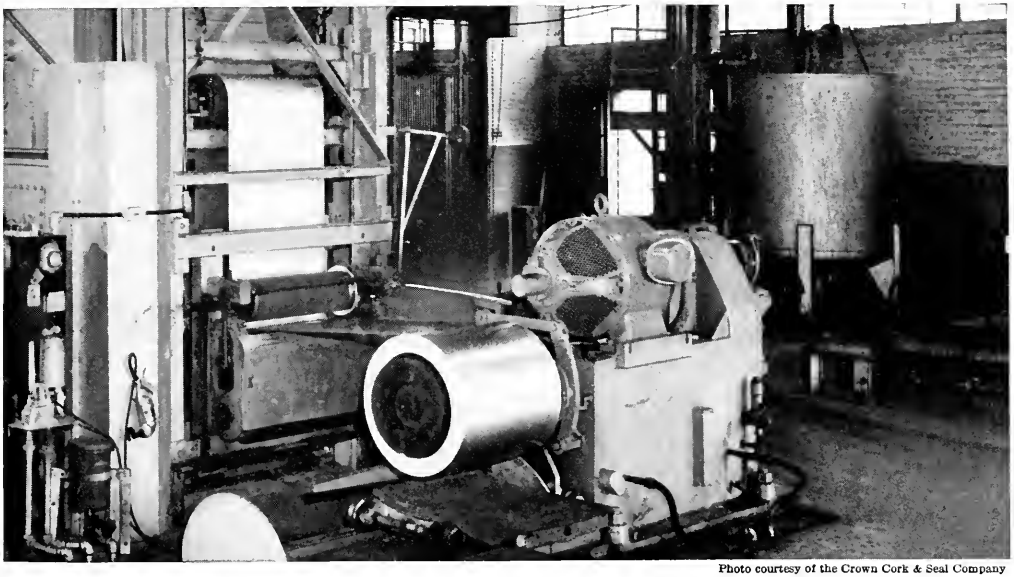


Photo courtesy of the Crown Cork & Seal Company

The best news about tin since we went to war

WHEN THE JAPS overran Malaya and the East Indies, they thought they had dealt a staggering blow to America.

For, overnight, tin became a most critical raw material, because America relies upon this bright metal for tin plate, bearing alloys, solder, collapsible tubes . . . *but mostly tin plate.*

However, Uncle Sam had an ace in the hole . . . *electrolytic tin plate.* In this process tin is deposited electrolytically . . . not hot-dipped . . . on steel strip. And only *one third* the normal thickness of tin is required.

Unfortunately, electrolytic tin plate is far from perfect as it comes from the plating baths. It is porous and not completely resistant to corrosion,

In order to make electrolytic tin plate usable, the tin deposit must be re-heated and *flowed* after plating. But until recently, even the best available re-heating and flowing processes were painfully slow.

Right here is where Westinghouse "know how" stepped into the picture.

R. M. Baker, Westinghouse Research Engineer, together with Glenn E. Stoltz, of the Westinghouse Industry Engineering Department, decided that the porous tin coating could be *fused* . . . through the magic of electronics . . . to give the tin plate the desired corrosion-resistant property and surface brightness.

Baker and Stoltz built a high frequency coil, using radio broadcasting oscillator tubes for their power source. Through this coil they passed electrolytic tin plate. The inductive heating effect melted the tin coating . . . and it fused smoothly and evenly over the porous surface.

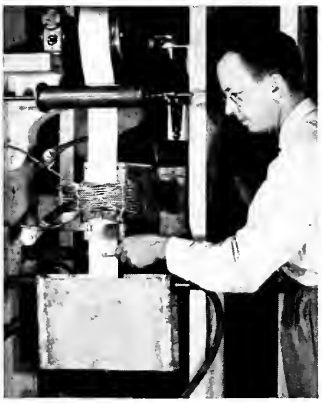
The new Westinghouse tin reflowing process is now in actual use, turning out gleaming ribbons of tin plate at better than 500 feet per minute. It will save many thousands of tons of tin every year!

o o • • •

What Baker and Stoltz did for the tin plate industry many engineering students in college today will do for other industries tomorrow.

Westinghouse knows where to find the future scientists America needs so badly on the industrial front . . . many will be among the technical graduates of the Class of '43.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Penna. Plants in 25 cities, offices everywhere.



RADIO WAVES FUSE TIN . . . R. M. Baker, Westinghouse Research Engineer, examines a test strip of tin plate which is passing through the experimental tin flowing mill. Baker joined Westinghouse after receiving his B.S. at Texas University. He earned an M.S. degree at the University of Pittsburgh.

Westinghouse

. . . making Electricity work for Victory

1941

Crego, Donald F., M.E. I., who recently accepted a position with the Elliott Company at Jeannette, Pennsylvania, has moved permanently to Pennsylvania. His new residence address is: 223 Walnut Avenue, Greensburg, Pennsylvania.

Edutis, Vitold L., E.E. I., wrote the Alumni Office that he is now working in the Centimeter Wave Research Section of the Radio Division at the Naval Research Laboratory. It is located at Anacostia Station, Washington, D. C. His home address is 3954—2nd Street, S. W., Washington, D. C.

Zabrecky, John G., M.E. I., was inducted into the United States Army on November 18, 1941; attended school at the Aberdeen Proving Grounds and was stationed at Fort Lawton, Washington for about eight weeks. He is now with the 4th Ordnance Company as Corporal Technician. Corporal Zabrecky left Illinois Tech and his job at the Power House of the Standard Oil Company, Whiting, Indiana, to enter the army.

1942

Dickens, Richard G., M.E. I., has recently moved from Chicago to New York. He may be reached at 117 Oakwood Avenue, Elmira Heights, New York.

Massett, Anthony L., Ae, was graduated as honor man of his company at the Great Lakes Naval Training Station and has been selected to attend one of the Navy's service schools, according to a recent news release.

Micheis, Jean E., A.S. I., has recently moved from Chicago to California. Her new mailing address is: 574 Hilgard Avenue, West Los Angeles, California.

Perkis, Russel H., F.P.E. I., is employed as a Fire Protection & Test & Inspection Engineer for the Carbide & Carbon Chemicals Corp., South Charleston, West Virginia, and is living at 1409 Lee Street, Charleston, West Virginia.

Walker, James J., F.P.E. I., is an Assistant Fire Protection Engineer, Carbide & Carbon Chemicals Corporation, South Charleston, West Virginia. He has recently changed his address to 1556 Kanawha Blvd., E., Charleston, West Virginia.

Westphall, Joseph A., M.E. I., is an Ensign in the United States Naval Reserve. His mailing address is U.S.S. Aaron Ward, Care Fleet Postmaster, San Francisco, California.

1943

Hahn, Alice J., A.S. I., a nurse in the United States Army, has been missing in action since the fall of Bataan.

Potter, Eugene, A.S. I., according to the following news release is serving in the air forces:

London, November 16, 1942. American fighter planes led by First Lieutenant Eugene M. Potter of Chicago, shot up troop-laden German trucks, military posts, and gun emplacements in low-level strafing assaults on the continent today.

Two years ago, while working on the staff of a Chicago newspaper at night, Gene spent his morning hours learning to fly.

Twice he traveled to Windsor, Canada, to apply for enlistment in the Royal Canadian Air Force. His papers were finally approved.

Three weeks ago, when he left a hospital in London to wear the American silver wings instead of the Royal Air Force blue, Potter, who was the last member of the now disbanded American Eagle

International News Photo

LIEUT. POTTER

Squadron to transfer to his own country's ranks, told how his plane and another Eagle fighter met four Focke-Wulfs. They finally eluded the Germans, when Potter used the remnants of his fire to down one of the Focke-Wulfs. The other enemy planes fled.

Gene's trip to the hospital came when he crashed on a practice flight. He escaped with slight leg injuries.

Earlier in his brilliant flying career, Gene and another American Eagle flyer drove so fast at two German planes that both became casualties. One crashed on land, the other dived into the English Channel.

When telling of this activity, which happened during a raid last May, Gene said:

When returning from a raid across the Channel Captain Robert Sprague and I, flying Spitfires, suddenly were beset by four Focke-Wulf 190s. I got on one's tail but a second F-W was on mine. Sprague was in a similar predicament with the other two enemy planes.

We had only a little ammunition in the four machine guns in each Spitfire and had expended all of our cannon shells in the raid.

I twisted away and forty feet above the water one of the F-Ws came at me head on. I let go with the last gun burst I had. The German flyer tried to pull under me and dove into the water.

Meanwhile, Sprague sent one German plunging into the channel. The other two German pilots, not realizing that Sprague and I were out of ammunition, flew away.

We now were low on gas. My wings were so shot up that I could see the channel thru the holes. I tried to talk to Sprague on the radio, but his set was not working. It was awfully lonesome. But Sprague and I got back to the base. We landed O. K.

1945

Atkins, Frank, A.S. I., has won his wings and a commission as Second Lieutenant in the U. S. Army Air Forces. He is now on duty at the Sarasota Air Base, Sarasota, Florida. His sister, Kate Atkins, is a Lieutenant in the army nurses corps, and a brother, J. B. Atkins, is a petty officer on duty at the Birmingham Navy Recruiting Station.

ENGAGEMENTS

1940

Mr. and Mrs. Harry H. Ludlam of Corinth, New York, announce the engagement of their daughter Miss Mary Ludlam to Mr. Charles M. toe Laer, E.E. A'40, son of Mr. C. M. toe Laer, Oak Park, Illinois. Miss Ludlam was graduated from Syracuse University in 1940, with a degree in Home Economics. Mr. toe Laer is employed in the Aeronautics and Marine Engineering Department of the General Electric Company in Schenectady, New York. The wedding will take place in Corinth, New York, on December 26th. They will reside at 1140 Myron Street, Schenectady, New York.

Upon the army depends the wedding plans of Mary Louise Hawxhurst, H.E. I '40, of Glencoe and Corporal George F. Collington of the U. S. Army Coast Artillery. Their engagement has been announced by Miss Hawxhurst's parents, Mr. and Mrs. Waldo Hawxhurst.

1941

The engagement of Chester Ginsburg, M.E. I., to Naomi Blank was announced by Mr. and Mrs. A. M. Blank. The wedding will take place early next spring.

Mrs. Moses Smith of 215 Walton Place, has announced the engagement of her daughter, Margaret Viola, A.S. I'41, to Corp. Howard Smith of Fort Riley, Kansas.

1943

Brouck, Robert R., A.S. I.' 43, the former Flying Tiger who shot down Japs over China and now is stationed at Orlando, Florida, has announced his engagement to Miss Virginia Scherer of 1643 North Melvina Street, Chicago. The wedding will take place on November 28 in the First Congregational church of Oak Park, Illinois.

MARRIAGES

1939

Johnson, Harold C., ChE. A'39, an Ensign in the United States Naval Reserve, was married to Miss Shirley H. Bock on July 4, 1942, in the Bethlehem Evangelical Church, Chicago, Illinois.

1941

Schmidt, Robert, M.E. I. '41, was married to Miss Barbara Bertram of Aurora, Illinois, Saturday, Sept. 5, 1942. The ceremony was performed at the rectory of Our Lady of Good Counsel church, the Rev. Fr. Leon M. Linden officiating. Mr. and Mrs. Schmidt will make their home in New York City, where the groom is stationed. He is an Ensign in the United States Naval Reserve.

OBITUARY

1899

Matthews, William D., E.E. A'99, died in New York City, Oct. 29, 1942, at the age of sixty-seven. He was graduated from Armour Institute with the class of '99, receiving the B.S. degree. He also received his Electrical Engineering Degree in 1911 and his Fire Protection Engineering Degree in 1918.

Mr. Matthews had a long and successful career in Fire Protection Engineering. He received his early experience and

training as an inspector with the Insurance Survey Bureau of Chicago from 1899 to 1904. For the next 20 years or so he was an inspector, and, from 1906 on was superintendent of inspections for the Chicago Board of Fire Underwriters. His keen understanding of the importance of thorough inspections from a fire protection standpoint and the correct but concise portrayal in the inspection report of the hazards and processes of the risk involved, prompted him to write text books which have been of great value to the industry; among these are *Manual of Inspections* and *Matthews' Fire Protection Engineers' Handbook.*

For the past fourteen years he had been associated with the Improved Risk Mutuals of New York City. He is survived by his wife, Mrs. Helen Matthews, a son in California, a daughter in Chicago, his father, and a brother.

1901

NOBLE, ALDEN C., E.E. A'01, chairman of the boards of the Merchants Fire Assurance Corporation of New York and its affiliated companies, died recently from a complication of complaints. His health had not been the best for some time, and he became acutely ill a short time ago. He is survived by Mrs. Noble, and a son, William Noble. Mr. and Mrs. Noble lived at Scarsdale, New York.

After being graduated from Armour Institute he was employed successively by the following insurance organizations: Insurance Survey Bureau of Chicago, The Continental, the Fidelity-Phenix and the Merchants Fire Assurance Corporation of New York and its affiliated companies. Among Mr. Nobles' writings is the novel *White Ashes* of which he was co-author with Mr. Sidney Kennedy. His hobbies were opera, mathematics, and golf.

WAS YOU THERE, CHARLIE?

One of the most potent weapons which the Nazis introduced to modern warfare, a weapon which hastened the downfall of France, is the deliberate propagation of Rumor. It is a weapon against which Americans must steel themselves with unceasing vigilance, for all the tanks, guns and ships in the world cannot bar its entry into our homes.

When the Nazi legions were rolling through the Lowlands, their civilian agents were busy among the people of France spreading rumors coldly calculated alternately to bolster and to undermine the morale of the French. Even before the Germans had entered France, the people heard that their government had fled; that Russia and the United States had declared war on Germany; that Great Britain had surrendered.

The conflict of ensuing rumors served well the aim of the Nazis to confuse and befuddle the French, and what semblance of unity the French possessed soon disappeared.

It is worth noting how at least one Russian guerrilla commander solved this problem in his own unit. Severe punishment was meted out to anyone who said, "I hear that . . . ." or "I understand that . . . ." Unless the man could say "I, myself, saw . . . ." he was to say nothing.

The next time someone tells you that he has it "on good authority" and so forth, just ask him, "Was you there, Charlie?"

Don't talk shop. The only person who cares to hear about your job is the enemy. If you happen to be turning out shell casings and the man next door is a turret welder why not talk about the Chicago Bears or the Green Bay Packers the next time you meet him down at Joe's? Hitler does not care who will cop the football championship this fall; he's playing in another league. The kind of scouts that work for Adolf don't care about Notre Dame's yardage gained by scrimmage; they want to know how many shell casings you turned out last week and how many you'll turn out next week.

Hitler is a hard man to reach by telephone these days. And even if you could pick up the phone and dial Berlin, he probably wouldn't understand you because he doesn't talk our kind of language.

Hitler is an easy man to reach by way of the grapevine of rumor and loose talking. And when his agents overhear you talking shop, you may be talking a language that Hitler understands. Don't let Adolf's stool-pigeons tap in on your conversation. And just to make sure that you don't spill the beans around the wrong guy, don't talk shop. That's the best way to short-circuit Hitler's party line in America.

U. S. ARMY RELEASE

MIDWEST POWER CONFERENCE APRIL 8-9, 1943

The 1943 meeting of the Midwest Power Conference will be held on Thursday and Friday, April 8-9, at the Palmer House, Chicago. This Conference is sponsored annually by the Illinois Institute of Technology with the cooperation of nine other midwestern universities and colleges and the local sections of the Founder and other engineering societies. The Conference is entering its sixth year under the present sponsorship. With the war production of the nation becoming more and more accelerated and with power needs for this production becoming more urgent than ever before, the theme of the 1943 meeting will be "Power and the War Effort." It is the hope of the Conference directorate that, with a program built upon this theme, the meeting will provide a real contribution and stimulus to the war effort. The popularity and worth of the Conference are indicated by the more than twelve hundred individuals who attended the 1942 meeting and the demand for its published Proceedings.

The purpose of the Midwest Power Conference has been established as that of offering an opportunity for all persons interested in power production, transmision, or consumption to meet together annually for the study of mutual problems, free from the restrictions of required membership in technical or social organizations. It is felt that academic sponsorship of a conference permits the freest possible discussion ranging from the technical through the economic and into the social aspects of the subject.

The tentative program of the 1943 meeting, as outlined by the directorate of the Conference, includes sessions on Plant Protection, Plant Maintenance, Fuels and Combustion, Electrical Distribution (two sessions), Diesel Power, Industrial Power Plants, Hydro Power, and Central Station Practice. The latter session is to be conducted by the Chicago Section of the American Society of Mechanical Engineers. Negotiations are now under way to have one of the sessions on Electrical Distribution conducted by the Chicago Section of the American Institute of Electrical Engineers. Among the proposed papers for the various sessions are the following: Present Status of Power Generation and Distribution, Plant

33 Fine Brews Blended into One Great Beer

Maintenance under War Time Conditions, Operating Problems during Blackouts, Protection Against Sabotage, Safety Regulations in Industrial Plants, Possibilities and Limitations of Small Hand-fired Furnaces, Effect of Coal Size on Plant Efficiency and Operation of Stokers, Steam Savings Suggestions, Diesel Fuel Oil Situation, Heavy Duty Stationary Diesels, Scale and Corrosion Problems, Capacitors and Their Use to Replace Synchronous Condensers and to Release System Capacity, Best Welding Practices for High Pressure Piping, Methods of Improving and Reliability of Plant Operation, Deposits on Turbine Blades in Topping Units, Protection of Plants from Bombing, and Generator Insulation—Testing and Recent Findings. The tentative program also includes joint luncheons with the Chicago Sections of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers and the main event of the Conference, the All-Engineers' Dinner, on the evening of April 8.

The sponsors of the Conference extend to all who have an interest in the field of power a cordial invitation. Why not mark the date, April 8-9, 1943, on your calendar now?

The Preliminary Program of the Conference will be printed in the March issue of the Illinois Tech Engineer Alumnus.

Inquiries in regard to the Conference may be addressed to Stanton E. Winston, Conference Director, or Charles A. Nash, Conference Secretary, in care of Illinois Institute of Technology, 3300 Federal Street, Chicago, Ilinois.

This 6 ft. diam. by 71 ft. 8 in. bubble tower was fabricated and stress-relieved at the Birmingham, Ala., plant of the Chicago Bridge & Iron Company. Towers like this are used in producing aviation gasoline and butadiene for making synthetic rubber.

ACOUSTICS

(From page 9)

of this the tube is ideally suited for measurements in connection with the development of better sound absorbing materials.

In connection with this project, one of the problems has been the development and construction of the necessary electronic apparatus. Although most of this work has been temporarily halted because of the war, it is hoped it will be possible to continue it in the near future.

In auditoriums, theaters, and radio studios it is highly desirable to be able to measure the "reverberation time" (the time necessary for a given sound to decay 60 decibels). From such a measurement it can be determined whether or not the correct amount of acoustical material has been applied. Here the high-speed level recorder is used, which is capable of recording sound-level changes at a rate of 600 db per second. In this instrument a sharp stylus slides over a moving strip of paper impregnated with wax. Of course this recorder is not limited to the measurement of reverberation, but can be used whenever it is necessary to record rapidly varying intensities.

Vibration Research

Before the development of modern radio technique it was necessary to employ heavy, bulky "seismic" instruments for the analysis of vibration. Such instruments often altered the vibrations to be measured. They were not only awkward to use but were relatively insensitive. As in the case of sound, the electronic vacuum tube has again come to the rescue by providing smaller, more sensitive instruments.

In our vibration studios two general types of electrical pickups are in use: the resistance type, and the piezo-electric crystal type. The latter has the advantage of sensitivity, while the former has that of stability. One of the instruments most often used in this work consists of a small, square, piezo-electric crystal, rigidly mounted at three corners, the fourth corner being free to move. For frequencies below 1000 cps, the output of this pickup is proportional to the vibration acceleration. By suitable electrical networks it is possible also to measure velocity and amplitude. A meter on this instrument indicates acceleration directly in inches per second per second, velocitiy in micro-inches per second, or amplitude in micro-inches. Thus in one instrument is contained a "vibrometer," a "velocitometer" and an "accelerometer," a combination impossible with the older mechanical types of instruments.

Since a crystal is fragile, the resistance pickup (often called a strain gage) is preferable for excessive shock vibrations. Here, as with the crystal, the electrical output of the pickup is passed through amplifiers and then to an oscilloscope where it is observed visually or photographed. In other cases it may be desirable to analyze this wave into its frequency components by means of a wave analyzer.

One of the important vibration problems now being investigated is the development of an improved accelerometer for a special vibration study. Such an investigation requires a thorough knowledge of vibration instruments as well as electronic circuits. The Foundation has men well trained in both fields and, as a result, such a study is proceeding much more rapidly than if a man trained in only one of these fields were attempting to solve the problem alone.

A vibration problem which has received considerable attention at the Foundation has been the isolation of both machinery and delicate instruments. In the former case it is required to prevent the transmission of vibra-

tions to the building while in the latter just the reverse is required. In both cases properly designed resilient mountings can do the job. However, it should be emphasized that just any resilient mounting will not do, since improper mountings may amplify the motion rather than reduce it.

Other problems in vibration have included the measurement of earth-borne vibrations from large reciprocating machinery and heavy forging hammers, a study of vibrations in connection with the Chicago subway and the measurement of many vibration sources causing noise. In all of these studies, both in acoustics and vibrations, many valuable suggestions have been obtained from time to time from other Foundation staff members. This is primarily the reason that industry looks to the Armour Research Foundation for solutions to its difficult problems.

RESEARCH

(From page 13)

he is President of the Co-operative Union and a member of the Psychological Advisory Committee of the Office of Civilian Defense in Chicago.

Dr. Howard J. Vincent, one of our most recent additions to the department, comes from Hillsdale College (Michigan) where he was Head of the English Department. Dr. Vincent has produced an imposing number of articles, based partly on new material discovered in the Public Record Office in London, articles that deal with the Eighteenth Century, especially in connection with the theater. At the moment he is completing a critical bibliography of John Keats, and he has another project already outlined to be pursued as soon as the bibliography is ready for publication.

Dr. Frederic R. White has two related fields of study and research, comparative literature and the theory and criticism of literature. At present he is engaged in making a translation of Beaumarchais, in editing a popular edition of Lucian, and in writing a critical work on *Western World Literature*.

Dr. Friedrich Karl Richter, who teaches German at Armour, studied at Bonn, at Breslau, and at the Sorbonne. He has also studied art at several schools in America and has displayed his paintings and lithographs at various exhibitions. He has written extensively on German literature, especially on German mysticism. Two articles on this subject were published this month in *Monatshefte* and in the *Journal of English and Germanic Philology*. Dr. Richter was co-operatively responsible for the establishment of a School of Languages at Colorado College and served as head of the German section for four summers.

Several members of the Department have recently entered the Armed Services. Dr. Donald S. Schier, who taught French at Lewis, was engaged in research on Imaginary Voyages. Dr. Robert Ackerman, who taught English at Lewis, had just completed an edition of *Gawain and the Carl of Carlyle*, a late metrical romance of the Arthurian Cycle. Dr. Alan Gewirth, who taught English at Armour, had completed arrangements for the publication of his work on Descartes.

The work of Allan Walker Read, who is also in the United States Army in the Intelligence Division, is perhaps deserving of more extended notice. Professor Read was a Rhodes Scholar and a Guggenheim fellow. He has written more than seventy articles, mainly on the American language, and for several years he was one of the assistant editors of the *Dictionary of American English.* He has almost completed a *Dictionary of Briticisms,* and he has material for another book, the title of which cannot yet be announced. He is an editorial associate of *American Speech* and secretary of the American Dialect Society.

Dr. Henry J. Webb, our latest addition, is particularly interested in the literature of military strategy and has published several articles on that subject.

Many upper classmen and recent alumni will remember Dr. Elder J. Olson, a member of the Department for the past seven years, who has recently accepted a position at the University of Chicago. During his years at the Institute Dr. Olson wrote two volumes of verse, *A Thing of Sorrow,* and *The Cock of Heaven,* both published by Macmillan; a novel or two, which have not yet been published; and a number of significant articles which have appeared in learned journals. The Institute was sorry to have him leave, but it was proud and happy to have had him at the outset of what will surely be a useful and a distinguished career.

There are other members of the Department, Professors Millard Binyon and Helen Stevens, Miss Mollie Cohen, and associate instructors Edgeley Todd and Hubert Odishaw, whose work should be mentioned; but enough has been said in the limited space allotted me to substantiate my statement regarding the character and quality of the members of this outstanding group of teachers and scholars.

WAR RESEARCH COMMITTEE

(From page 16)

be admitted when their work is accepted by the committee. Research projects arising from special interests and initiative of the faculty members, and also projects arising from special requests or orders from Federal authorities, will qualify an instructor for membership.

Twenty-five projects are now under way, in eleven different fields—chemi-

cal engineering, metallurgy, X-Ray inspection, Raman spectra, spectroscopic analysis, physical and organic chemistry, heat transfer, aerodynamics, airplane stress analysis, radio communication and an elaborate program of work in electronics.

PRE-ENGINEERING

(From page 18)

One of the most interesting phenomena of life at camp from the pedagogical point of view was the beneficial effect of a healthy spirit of competition. Rivalry between the athletic teams of the several cabins inspired boys who had had very little experience in the games to learn to play very well indeed. Rivalry between cabins for the weekly prize of an apple pie for the best housekeeping kept them all amazingly clean. For the privilege of exemption from three study periods granted to the six top ranking men each week, all strove for the best possible marks on quizzes and for the highest ratings in sports. This competition, so far as I could see, promoted neither jealousy nor feelings of inferiority. The esprit de corps of each section was high.

Of the forty-eight boys, forty-one

elected to become Freshmen of Illinois Tech. Thirty-four are now on the Armour Campus. Seven, I am told, will come to us in February, six of them as cooperative students. One is a cooperative student at Rockford College which is affiliated with us in its engineering program. One elected to go to Massachusetts Institute of Technology, and, although lost to us, is not lost to the engineering profession, to which he should be a great credit. Until the grades for the present semester are recorded, it will be impossible to say how well the thirty-four students now in school have done in competition with boys with four years of high school training. That they are playing an important part in student activities is evidenced plainly, however, by the freshmen elections of October twenty-third. Three of the six class officers returned were erstwhile Pre-engineers, namely the President, the Social Chairman, and the Representative to the Student Union Board. That half of the officers for this class of over six hundred were chosen from this little group of thirty-four indicates, as the students would say, that it "has something."

SANFORD B. MEECH.

ENSIGNS

(From page 18)

height with a minimum of 124 pounds.

Opportunities for a lifetime career in the United States Navy exist in this midshipman training, for naval reserve ensigns, after a year at sea, may apply for transfer to the regular Navy.

Inquiries may be made at any Navy recruiting station or sub-station as well as at the following branch Procurement Offices: Cleveland, Ohio, Central Armory; Detroit, Michigan, Book Tower Building; Indianapolis, Indiana, 429 N. Pennsylvania Street; Kansas City, Missouri, Finance Building; Louisville, Kentucky, Post Office Building; Minneapolis, Minnesota, Roanoke Building; St. Louis, Missouri, Missouri-Pacific Building; Des Moines, Iowa, Old Federal Building, and Milwaukee, Wisconsin, 633 North Fourth Street.

WAR COUNCIL

(From page 23)

by the ITSA at this time to enlarge the group. Bolstered by these new men, the Council arranged for a mobile unit of the Red Cross to come to the school for an entire day for a mass blood donation by the students. On account of the extensive preparations of the Council the Red Cross was able to get 103 pints of blood on that one day and could not take care of the full complement of volunteers. The remainder went down to the Red Cross headquarters to make their contributions.

With the return of the underclassmen in September the Council again increased in size. At this time it advised the Armour College Rifle Club, which was considering closing its doors to new members, to sponsor a membership drive instead. Even though there is a shortage of ammunition, the club is now instructing as many students as possible in the handling of a rifle.

At the time of this writing the Council has two main objectives. One is a drive for the collection of scrap metal, not only from the campus but from the fraternities. The old pipe organ in the Student Union and the iron fences on the grounds of fraternities and the Graduate House are larger objectives in the drive. The other current task of the council is the organization of a First Aid Corps on the campus. This corps is to consist of students who have either standard or advanced Red Cross certificates in first aid. A complete new first aid kit and several stretchers have been purchased by the school to be used by the corps. The school's medical adviser is working with the students on the project. Such a group will be trained to take over in the event of emergency on or near the campus.

Similar councils have been organized at other colleges in the country but the one at Illinois Tech is among the most active. Every college not having such an organization is urged to create such a body at once, because there is no community that is not subject to attack from the air, and because organized effort is necessary in all phases of the war effort.

WIN THE WAR

(From page 26)

victory almost always is. For instance, we look in the daily paper. We see that with some 125 games played in the American League, the Yankees are only eleven games ahead of Boston. This means that out of every ten games played, the Yankees have won just one more game than Boston. This is not even one game a week—it is about three games a month of the playing season. Yet just these eleven games out of 125 will probably mean victory for the Yankees.

We turn to racing. Lots of people know the names of the Kentucky Derby winners, but few know who came in second and no one cares, yet the difference may have been only a matter of inches. Offhand one would think, what do a few inches matter compared to a mile and a quarter? Yet out of the whole mile and a quarter run, only these few inches count—the margin for victory. One cannot almost win a race—the margin must be there.

Medical science tells us that if our bodily temperature were to rise, for just a short time, from its normal of about ninety-nine degrees to a point just nine degrees higher, death would result. Just a small difference but it's the margin that gives us life. One cannot almost stay alive.

Of the last war a historian has said that the reason the Allies won was not that they were braver, but that they were braver longer. The short time longer that meant victory. We cannot almost win a war.

We turn again to our primitive man. If he has done a plus job of inspection, and has found rocks that will fly just a few degrees straighter than

the stones of the enemy, if he has found clubs that will last just a few blows longer than the clubs of the enemy, he has gained the margin of superiority that means the difference between life and death for him.

We must avoid average inspection —it is a great danger and avoiding it will require constant effort because at times our job will become monotonous and routine. At times we shall be doing similar things all day long, and we shall probably be seeing gages in our sleep. We shall be likely to forget that we are inspecting equipment on which, every moment, men are staking their lives. Suppose that we inspect 1,000 shells a day. And suppose that out of each 1,000 shells we fail to detect one bad one—one tenth of one per cent—six shells in a week. Six guns jam—Death takes his toll, and the margin for victory is lost. This is a race. Out of the whole mile and a quarter only those few inches count —that last shell of the day may represent the margin for victory. If it fails, where lies the blame? We must have inspection, *PLUS*.

This is not an eight hour a day job —every one of the twenty-four counts. We do not know how small the margin will be, or where we shall find it. It may be a matter of eating right and sleeping right—keeping ourselves fit for our eight hours on the line. In fact, it may be the small margin of the day between dinner and bed-time that we could use in study to make ourselves more valuable, or improve our job, that may prove to be the margin for victory. We must consider all of these things—they are all part of a plus job.

Napoleon said, "God is on the side of the battalion with the best equipment." To have the best equipment, we must have the best inspection. We must see that our boys are furnished the right kind of stones. We must give them inspection *PLUS*. Then, truly, shall we be able to say we have helped *WIN* the war.

HELP!

(From page 27)

ship and show birth certificates. You must pass muster as belonging to no subversive organizations and as being a good American citizen.

So you are urgently needed for production, research, design, and for officers' commissions. There are too few of you with the training so much needed in the above capacities, relative to the enormous number needed, to have the country misplace your intelligence. If we take all college graduate engineers in the country that are physically able for combat divisions, I doubt if we could muster five divisions. If you were drafted as privates or if all of you joined the service, this would seriously slow production with its serious consequences, unless you were as privates and officers allocated back to industry.

I regret to state that Miss Carol Keplinger has left for a position of greatly increased responsibility. She is now with the Curtiss-Wright Corporation in Passaic, New Jersey. Miss Mullowncy has taken her place and will do all she can for you.

JOHN J. SCHOMMER.

BOOK SHELF

(From page 45)

Mechanics, a work embracing Strength and Elasticity of Materials, Theory and Design of Structures, Theory of Machines and Hydraulics. It was checked by the author's son, E. D. Low.

CHARLES O. HARRIS

Ripper's Heat Engines, Longmans Green & Co.

This little book is a revision by A. T. J. Kersey of a text published first in 1889 under the name *Steam.* In the first five chapters the book outlines with a minimum use of mathematics the fundamentals of conversion of heat energy into mechanical energy. Most of the remaining fifteen chapters deal with the description of various types of prime-movers and power plant equipment. The steam engine is dealt with in considerable detail as seven of these fifteen chapters describe the construction and details of reciprocating engines. This appears to be entirely out of proportion to their present position in the field of power generation.

A considerable portion of the equipment discribed is not in use in America but is employed in British practice.

The last two chapters deal with properties of gases and construction of the internal combustion engine. The book should be of interest to one wishing to obtain a knowledge of the equipment used in the small power plant.

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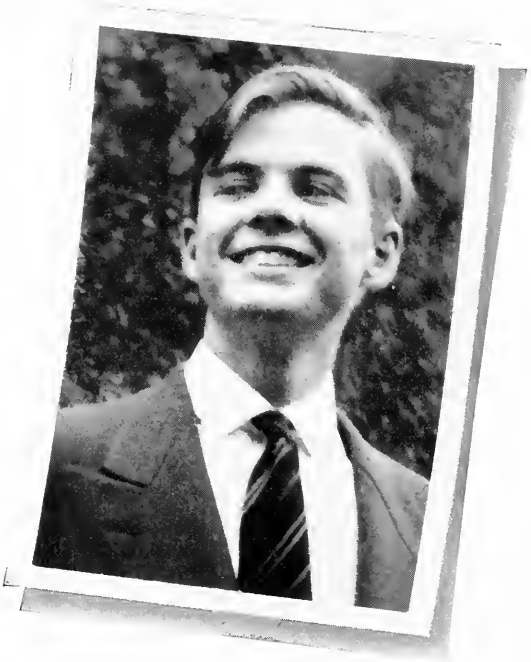


HE has just turned eighteen. Shaves twice a week and maybe a hair or two is sprouting on his chest. He shies away now when his dad tries to be affectionate and we noticed some lipstick on one of his handkerchiefs after a country club junior dance not so long ago. But it seems only yesterday, perhaps it was the day before, that he was a chubby legged kid swinging from the arch of the doorway, leading to the dining room, in a gadget that was something like a breeches buoy and he was sucking at the end of a turkey bone.

He went back to school this Fall, a tall, athletic lad, budding into manhood, but there was something else on his mind beside the football and hockey teams or the little blonde girl with whom he had "palled" around during the Summer. It seems as though he was listening for a certain call—the Clarion call that poets sing about—and, perhaps we just imagined it, but we thought we saw an upward jutting of his chin, a certain light in his eyes, and a sort of a rearing-to-go expression in his face.

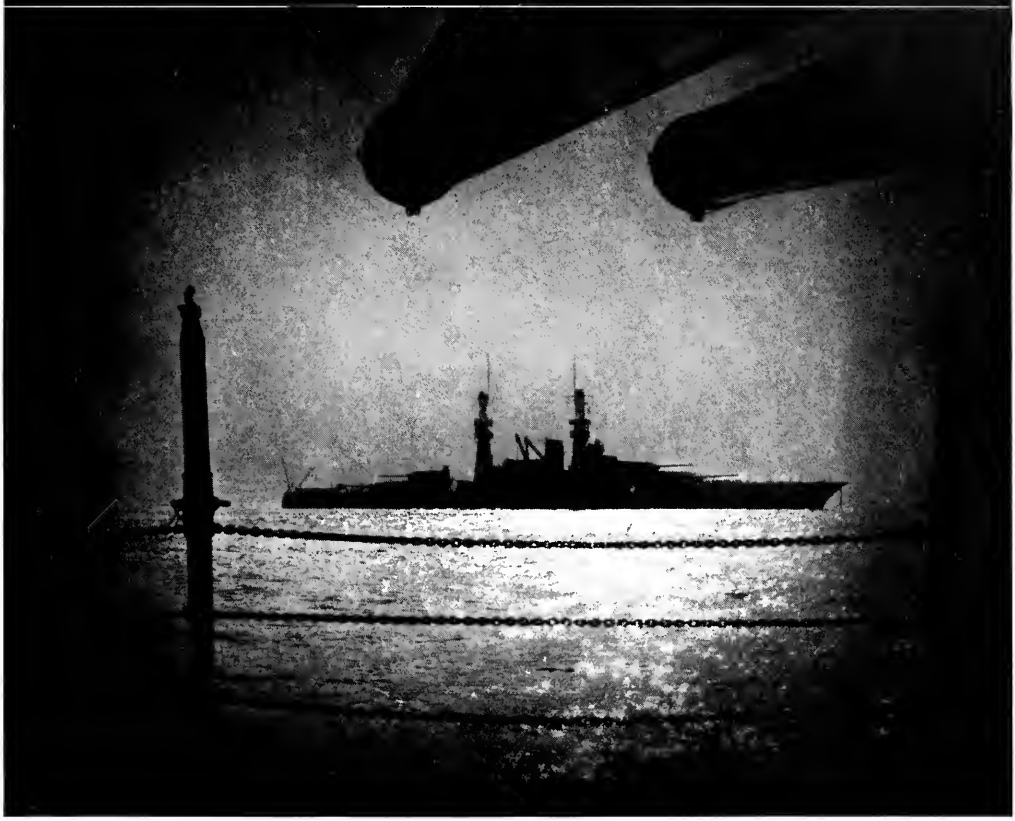
It chilled us a bit in the region of our heart, when we thought of his discarding the sports coat for the "O.D." of the Army or the blue of the Navy. There was a bit of a catch in our throat as we thought of his putting aside his football helmet for one of steel; of his hanging up his hockey stick and reaching for a gun. After all we still regard him as just a little boy.

They tell us that the eighteen and nineteen year old lads are to be called to the service. When that day comes to us there will be prayers, but no tears. We shall not mourn nor shall we be fearful. Rather there will come welling up from our hearts that warm feeling of pride that millions of other parents will sense when their beloved lads marched away. Our lad is no different than the others. We are no different than other loving parents, nor is our sacrifice any greater. They are going to make great soldiers, sailors, marines and fliers out of these youngsters. And they will become a mighty force when they take their places beside their brothers in arms. They too know what they fight for. They too know full well of the sacrifices that must be made before the evil powers that threaten the world can be overcome.

And let us not forget that they are counting on us. They know that we shall not fail them.

God be with them and their brothers.

Battle wagons have glass ears...



SOMEWHERE on the tough hide of U. S. warships are mounted what look like inverted glass mixing bowls.

These are the radio lead-in insulators, the "ears" through which the battle wagons get their orders. They are made of Pyrex brand electrical glass, as are the insulators in the ships' antenna, because the service requires the best and most dependable materials available.

Today, with metals scarce, the raw materials for glass are fairly plentiful. And glass is being put to work at many urgent tasks. Planes, tanks, ships, trains, for example—all use some contribution of Corning research in glass. The giant dairy industry, faced with a metal piping shortage, is now working with special glass piping recently developed at Corning. In chemical, food, and explosives plants, glass piping and glass pumps are handling everything from soup to HCL.

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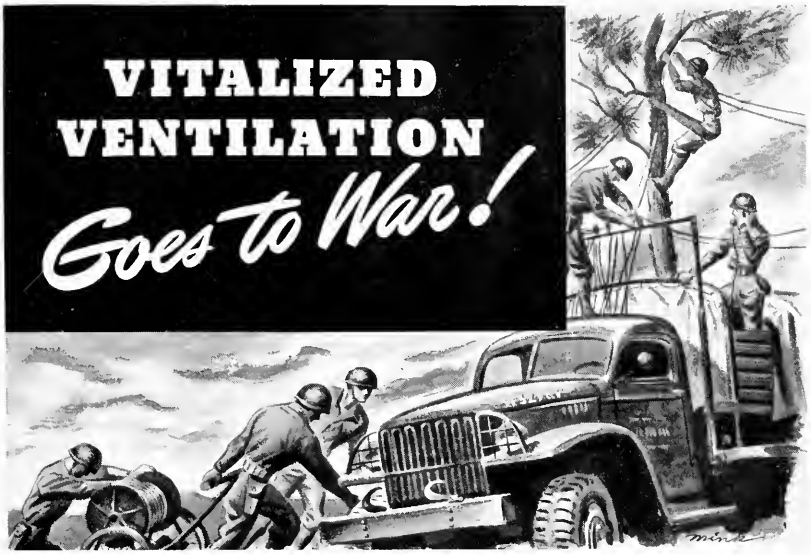

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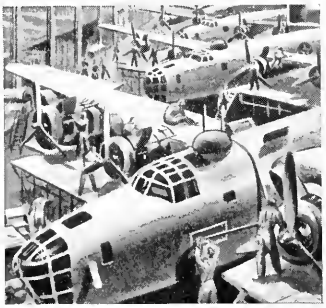

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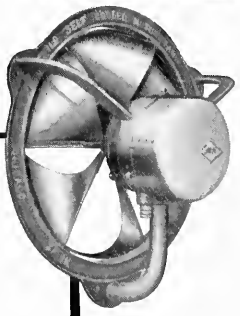

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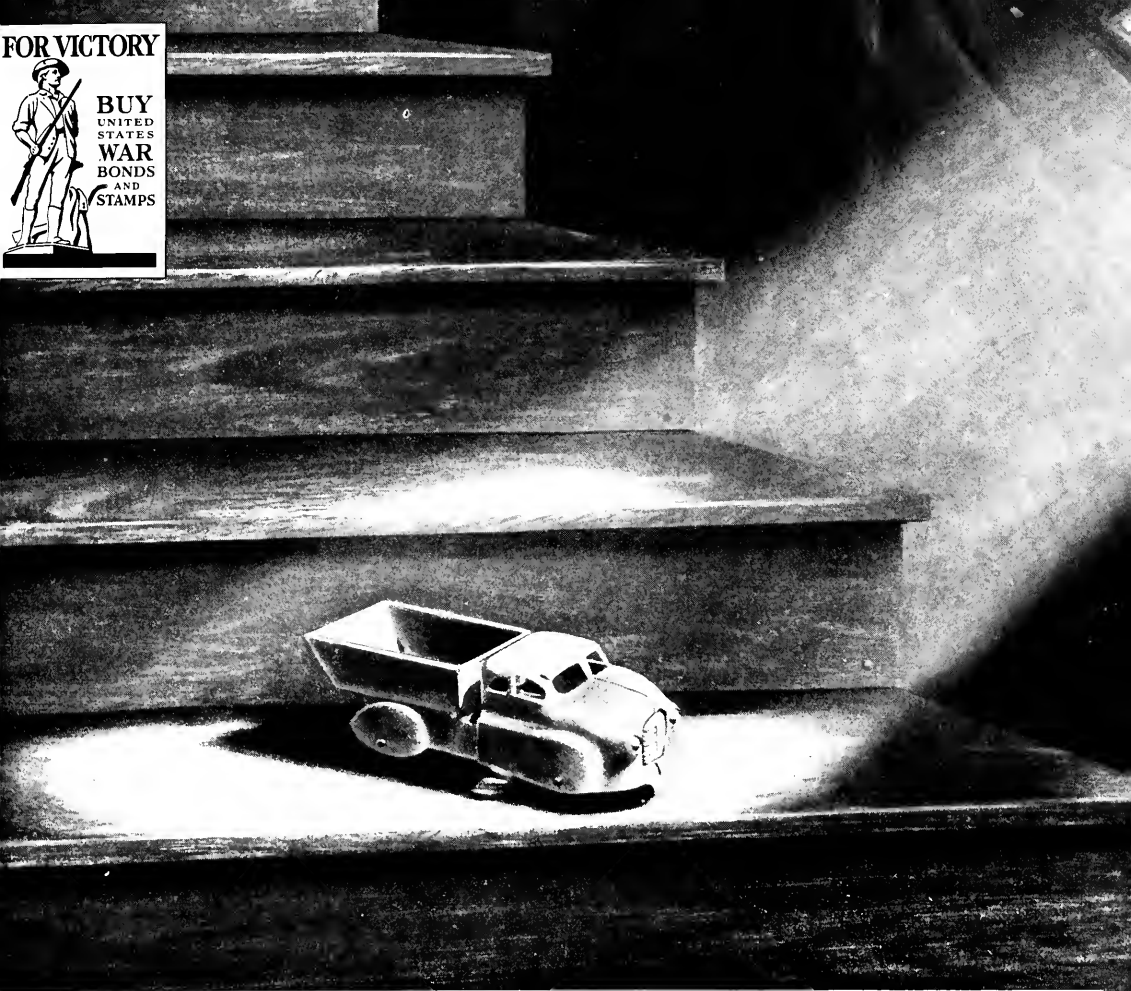

DEATH CAR...

ONLY A CHILD'S TOY on an unlighted stairway. Yet as lethal as a speeding truck for killing or crippling. For causing heartbreak and tragedy in someone's home.

Accidents . . . in the home . . . on the highways . . . in factories and offices . . . cost this nation 102,500 lives last year. This tragic toll, preventable to a great extent, was augmented by the permanent disabling of 350,000 other people . . . by 9,000,000 lesser casualties.

Production-wise, America's war effort lost heavily. In all, 430 *million* man days were lost forever. Enough to have built a total of 20 battleships, 100 destroyers, 9,000 bombers, and 40,000 tanks! Money-wise, the loss was almost 4 *billion* dollars!

Where did these accidents happen? Two-thirds of them happened outside of industry. In the home, where workers take chances they would not dream of taking on the job. They happened in darkened hallways . . . in bath tubs . . . in garages and basements. They happened in industry where someone gambled with safety.

No matter what you do, your life is precious to this nation. Don't take chances with it. Guard it for America . . . at day . . . and at night. Fight carelessness, the Master Saboteur! Join the anti-accident crusade! Help save a life!

The perfection of the famous "Eveready" fresh DATED *flashlight battery called for coordination between various Units of Union Carbide and Carbon Corporation. The exact grade of graphite necessary for the "mix" was developed by the Acheson Graphite Corporation. Special alloy for protecting molds and machinery was produced by the Haynes Stellite Company, and Carbide and Carbon Chemicals Corporation provided a specially prepared paint made of "Vinylite" resins for the spun metal cap.*

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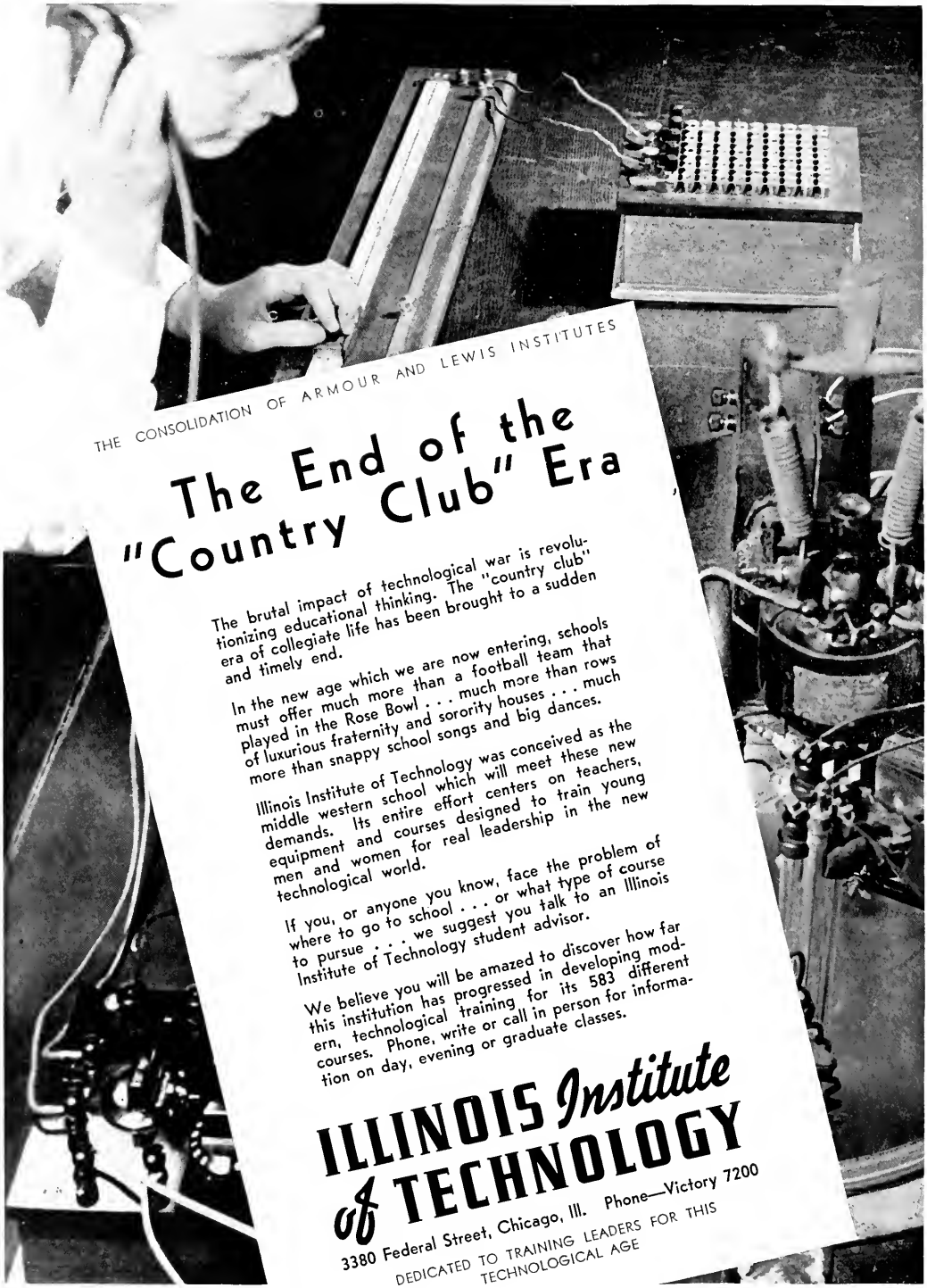

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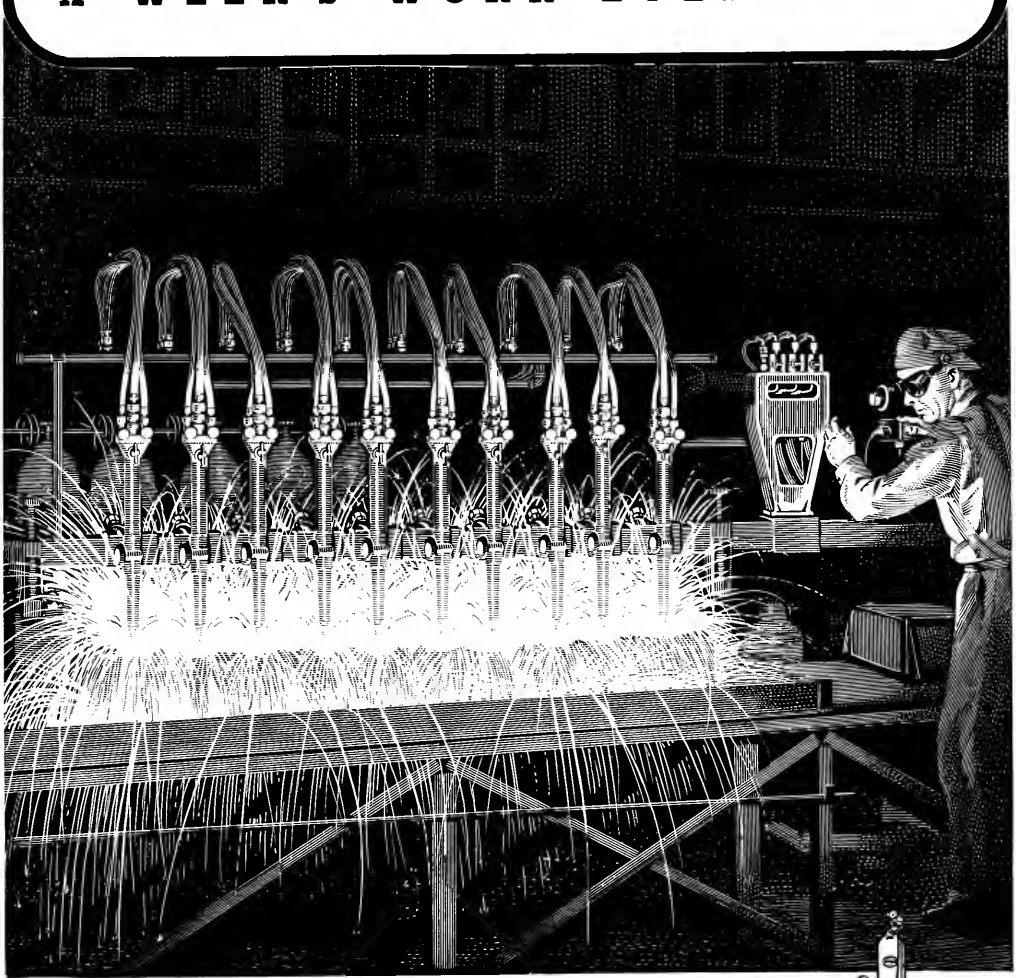

TUBULAR headers now race off the production line at Combustion Engineering Company's Chattanooga, Tenn. plant at the unprecedented rate of 100 a day — with the aid of this Airco 10 cutting torch Oxygraph. Compared to the 19 a day formerly produced, it's practically a week's work every day. This Airco oxyacetylene cutting machine is making metal-working history — never before was such an elaborate multiple torch arrangement deemed practicable. Yet, as perfected by Airco, every beneficial feature of flame cutting is retained. Steel is accurately cut to the desired shape with amazing speed. And there is no time out for sharpening or regrinding.

New, faster, better ways of producing more planes, ships, tanks, guns and machines are made possible by the efficient and proper application of the oxyacetylene flame.

To better acquaint you with the many things that this modern production tool does better we have published "Airco in the News", a pictorial review in book form. Write for a copy.

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The thousands of experienced engineers who are doing so much to help win victory were students once, and no doubt often wondered what they would do after graduation—just as you probably do now.

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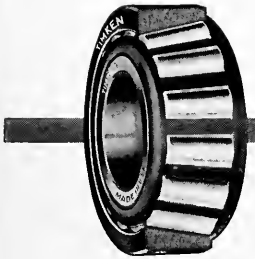
After world-wide destruction must come world-wide reconstruction; Timken Tapered Roller Bearings will play as important a part in the new machines of peace as they are doing in the machines of war.

If you have not done so already, begin now to acquire a thorough understanding of the design and application of the Timken Bearing. Our engineers—bearing specialists of many years' standing—will be glad to help you.



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...the milder, better-tasting, cooler-smoking cigarette

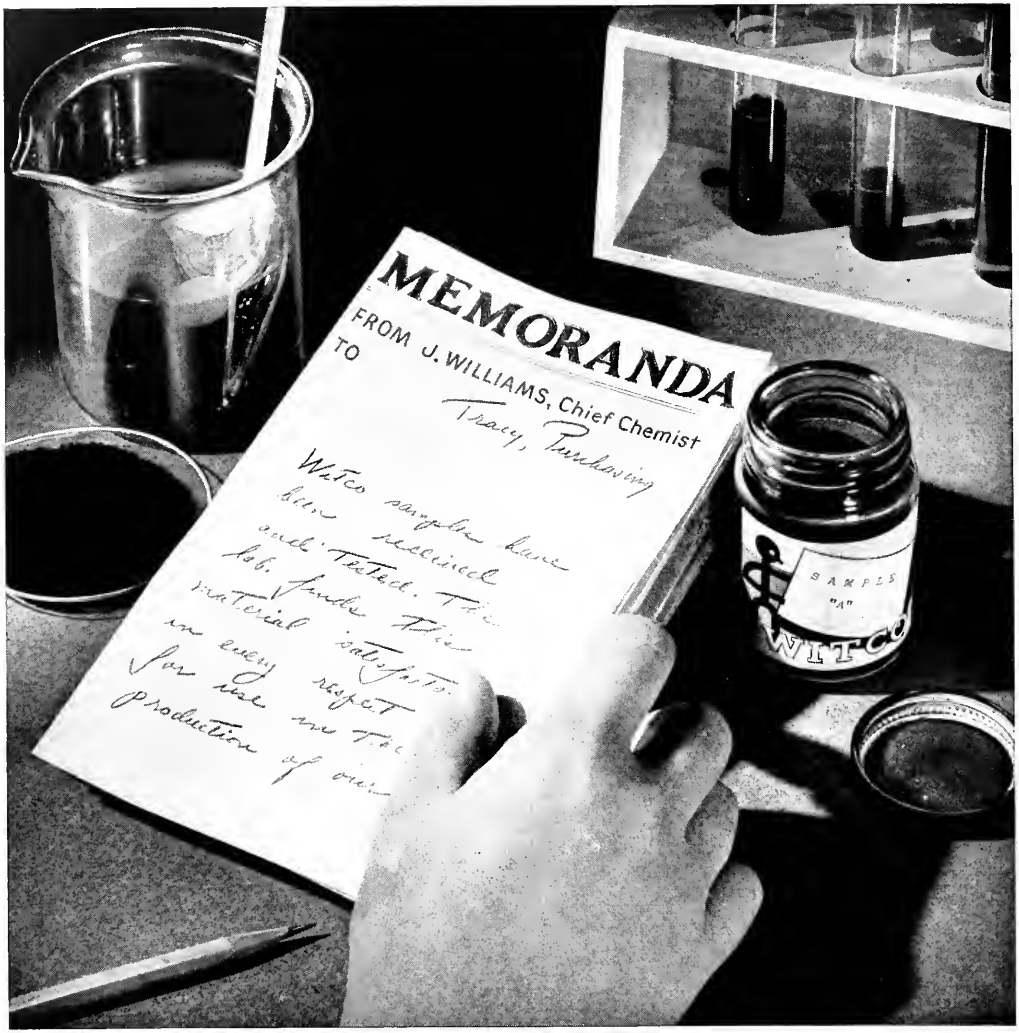
Again Chesterfields are out front with their bright and unusually attractive *Special Christmas Cartons.* Send them to the ones you're thinking of... their cheerful appearance says *I wish you A Merry Christmas,* and says it well... and inside, each friendly white pack says *light up and enjoy more smoking pleasure.*

They Satisfy

ILLINOIS TECH ENGINEER

AND ALUMNUS

MARCH, 1943



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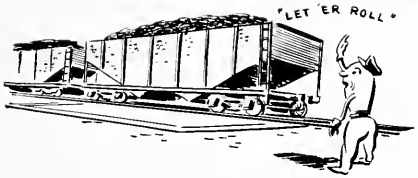
WITCO

G-E Campus News



LET HER ROLL!

AT A PLANT of the Hanna Coal Company in Ohio, loaded coal cars are emptied by being rolled onto a rotary dump, fastened to the rails by a mechanical device, and then rolled upside down over a chute.

Now the dump is not supposed to revolve again until the empty car has been righted and sent on its way. But once in a while, when a car took a particularly long time to move off, the dump would revolve the next full car and derail the empty one.

The difficulty was remedied when a G-E photo-electric relay and light source were installed on opposite sides of the track at the "empty" end of the dump. Now the dump can't revolve so long as the light beam between the light source and the phototube in the relay is blacked out by the body of the empty car.

NOTHING TO IT

HERE'S how the G-E supercharger works—à la Hollywood.

In Warner Brothers' "Desperate Journey," a Nazi officer asks a captive American flyer, "How do you manage to supercharge the engines at the extreme cold of these high altitudes?"

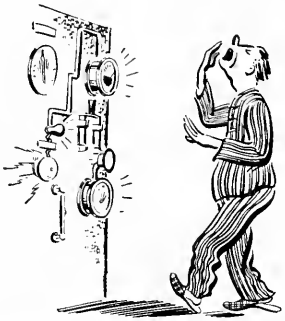
Johnny, the prisoner (played by Ronald Reagan) is crafty. He stalls a bit and then, assured that no one can overhear, he whispers, "It's done with a thermo-trockle."

"A what?" The awed Nazi leans closer.

"A thermotrockle amfilated through a daligoniter," explains Johnny, beginning to sketch with his left hand.

"You see, the dornadyne has a frenicoupling and the amacmeter prenulates the kinutaspel hepulace—here—and the—."

All of which thickens the plot, confuses the Nazi, and gives Johnny an opportunity to slug his guard and escape —without revealing a single military secret.



TESTING

BACK when Herbert Hoover was in the White House, four specimen rods of an alloy steel used in steam turbines were imprisoned in a thermostatically controlled electric furnace at one of the G-E laboratories.

The purpose was to study the effect on the metal of prolonged high temperature and stress, in order to improve the design of the turbines.

Usually these "creep" tests are run for only 1000 to 3000 hours, but the engineers never took these four specimens out of the furnace until the other day—thus obtaining what they believe to be the first data based on a 100,000-hour test.

Throughout the 100,000 hours an ingenious alarm system guarded the specimens. In the event of trouble, a red light would flash and a bell would ring, summoning a watchman who could get one of the engineers out of bed to remedy the situation.

GENERAL ELECTRIC

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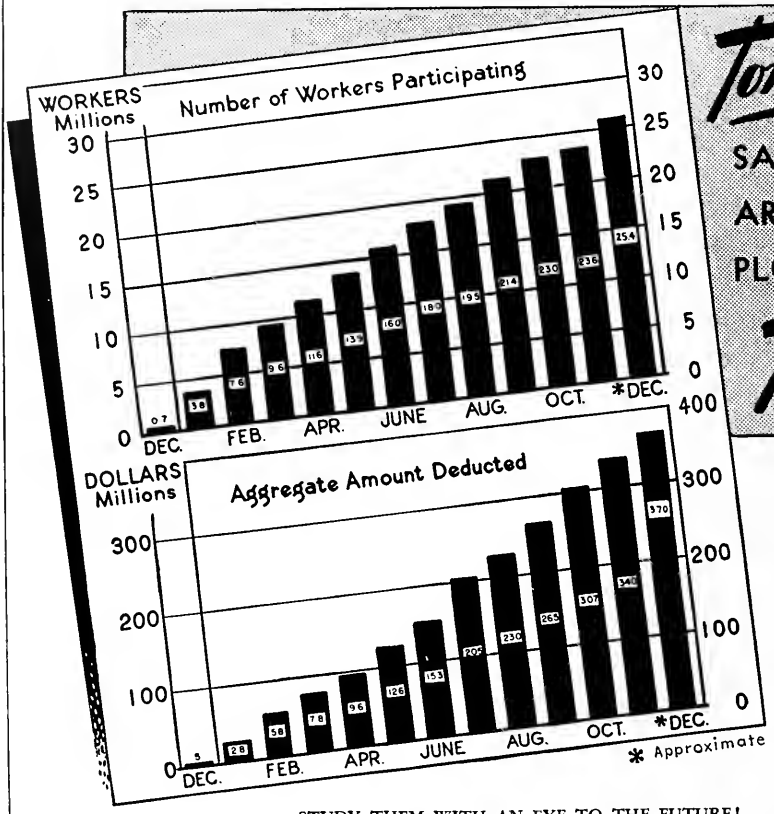

Tomorrow's SALES CURVES ARE BEING PLOTTED . . . Today

THESE CHARTS SHOW ESTIMATED PARTICIPATION IN PAYROLL SAVINGS PLANS FOR WAR SAVINGS BONDS *(Members of Armed Forces Included Starting August 1942)*

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to FOUR AND A HALF BILLION DOLLARS per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—*and mountains of brand new consumer goods tomorrow.* Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns $4 for every $3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory —*and tomorrow's sales curves*—are being plotted today by 50,000,000 Americans who now hold WAR BONDS.

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with

War Savings Bonds

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Currently—to save steel—to save time in war-necessitated construction—poured concrete is proving its strategic value.

Concrete, to most people, is merely a mixture of sand, gravel, water and cement. That this common material involves chemistry of such complex character that intensive research has failed to clarify the reactions completely, is a surprising fact even to those who work with it.

It is known, however, that in the "setting process" the silicates, aluminates, lime, and other compounds present in cement undergo chemical change with water, forming new crystalline compounds. This is what gives concrete its great strength and durability.

It is also well recognized that calcium chloride, a chemical produced by Dow and marketed as Dowflake, added to concrete mixtures not only speeds the hardening process from 50 to 75 per cent, but also results in a stronger, more durable concrete.

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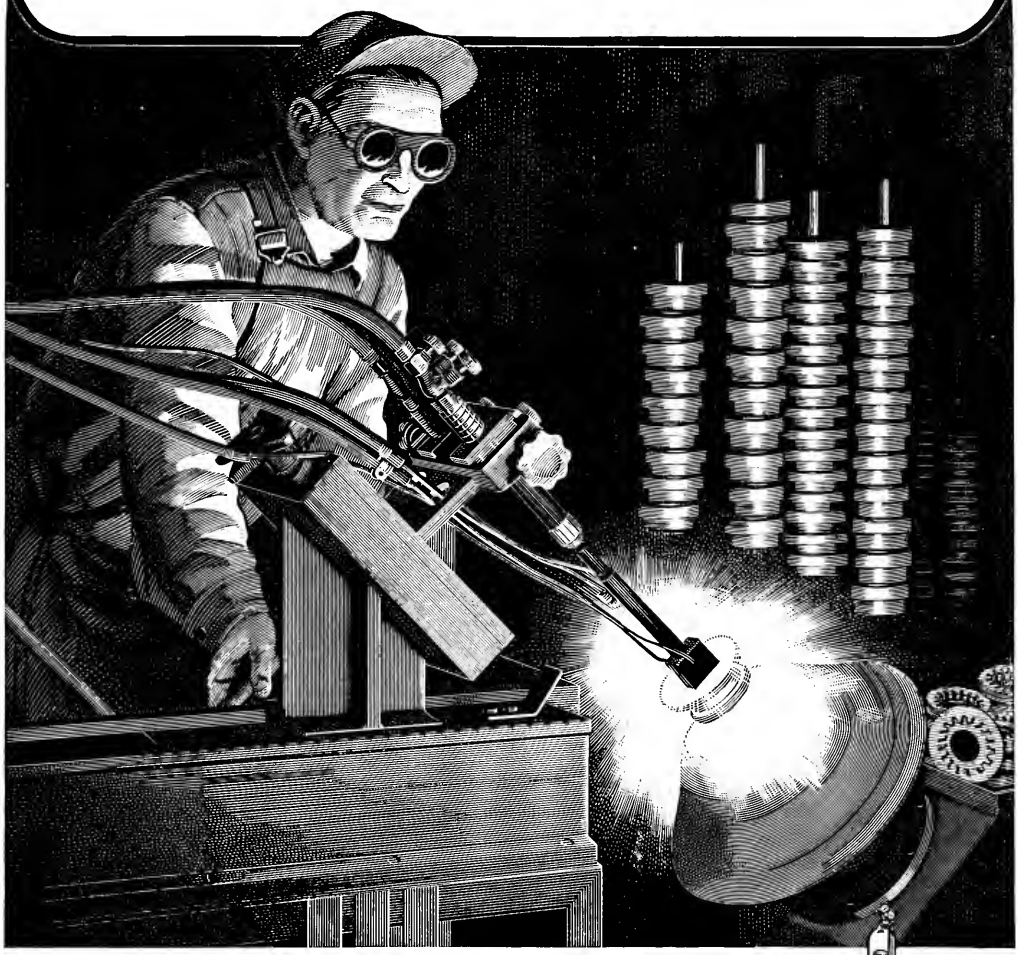
CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

DOWFLAKE

GEAR TEETH HARDENED IN 8 SECONDS



IN only a few seconds the oxyacetylene flame adds greatly to the service life of this internal gear. Teeth and other surfaces subject to wear are rapidly hardened by the modern oxyacetylene flame treating process. The depth of hardening is easily and accurately controlled, without affecting the inherent toughness of the core metal.

Airco Flame Hardening gives all the advantages of other surface hardening methods plus speed and ease of application. Simple arrangements using one or more torches permit flame hardening of a large variety of metal parts on a production basis.

Many other applications of the oxyacetylene flame are finding ever widening application in speeding and improving production of ships, tanks, guns, rolling stock and planes. This versatile tool slices through steel with remarkable speed — welds metal into strong, light units — sweeps surface rust from metal structures to extend the life of paint jobs — gouges steel and iron quickly and accurately.

To better acquaint you with the many things that this modern production tool does better we have published "Airco in the News", a pictorial review in book form. Write for a copy.

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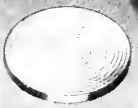

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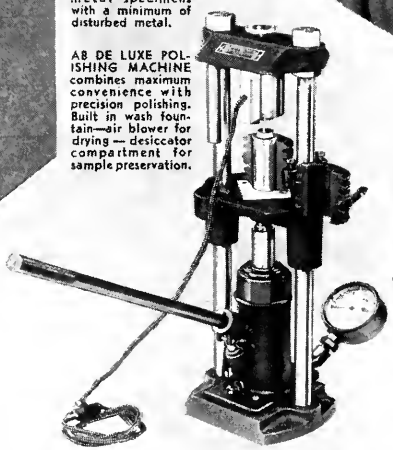

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Adolph I. Buehler

OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS

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Maurice J. Murray is associate professor of chemistry, and acting chairman of the department.

Paul O. Ridings is director of the news bureau.

John J. Schommer is director of athletics, director of placement and professor of industrial chemistry. He is a special adviser to the selective service system.

Howard P. Vincent is assistant professor of English.

The cover picture **Tanks** is from a photograph received by courtesy of Chicago Bridge and Iron Company.

ILLINOIS TECH ENGINEER
AND ALUMNUS

MARCH 1943
VOLUME 8 NUMBER 3

IN THIS ISSUE

Published in October, December, March, and May. Subscription rate $1.50 per year. Editorial and Business Office, Armour College of Engineering of Illinois Institute of Technology, 3300 Federal Street, Chicago, Illinois.

"WHAT'S COOKIN'" IN THE DEPARTMENT OF CHEMISTRY

By
M. J. MURRAY

Where once were living accommodations for three families, there are now, in Chapin Hall, three laboratories devoted exclusively to chemical research. The odor of sizzling steak is changed to that of pyridine, and deep fat is not for browning meat croquettes but for keeping flasks at high temperatures necessary to many chemical reactions. Spatulas similar to those used in the kitchen are in the chemist's research equipment, but the housewife would find no use for a vacuum pump that removes all but about one millionth of the air from a flask. Pots and pans are replaced by beakers, flasks, gauges, fractionating columns, cathetometers, balances and cylinders of compressed gases. Out of these and many other tools, out of the vile odors, out of the hard work, and yes, out of the fun of research may be brewed a new theory, a superior water repellent for use by the Navy, or a drug to take the place of quinine.

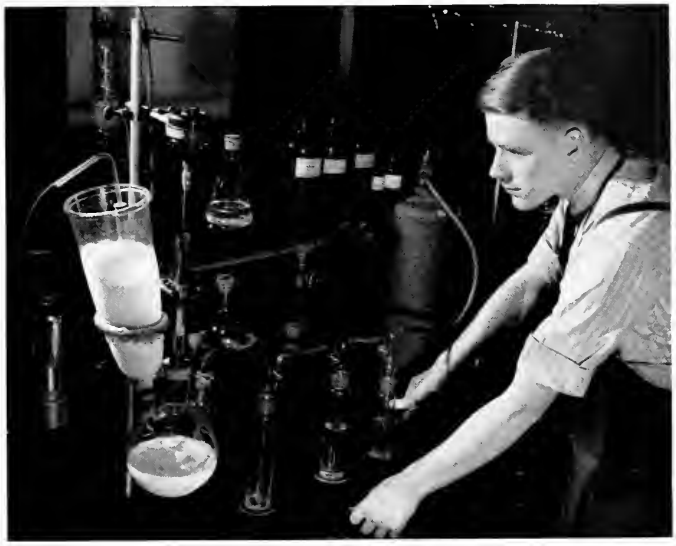
In the summer of 1939 the Section of Chemistry, which was then a part of the Department of Chemical Engineering, installed the first chemical research laboratory. When the Section changed to a full-fledged Department in 1940, a new laboratory was opened; and in 1941 still another flat was transformed. Meanwhile two laboratories for research were equipped on the West Campus.

In 1939 there were no graduate students majoring in chemistry; at present there are six candidates for the master's degree and five others who are working on their Ph.D. theses. This includes only resident candidates; those enrolled only in night school are omitted. The importance of a strong graduate program in chemistry at a progressive institution of learning is evidenced by the fact that for the past several years in the United States more Ph.D. degrees have been granted in chemistry than in any other single field.

In order to keep the staff and graduate students abreast of recent advances in chemistry there are two seminars, one in the broad field of chemistry and the other, in collaboration with the Department of Physics, covering the subject of spectroscopy. In addition, the graduate staff holds bi-weekly conferences to plan the policy and organization of research.

Under the seven headings below is outlined briefly the research of the men who at present are resident, full-time members of the Chemistry Department's graduate staff. Although the titles may appear flippant, not one of the group takes his research lightly.

Harold Pokras, a graduate student, uses considerable phosphine in his research. A safe generator for the preparation of this spontaneously combustible, lethal gas is illustrated. Note: The apparatus is used in a ventilating hood and was removed only to obtain this photograph.



Harvey Taufen is one of several graduate students working on molecular spectra. In this photograph, he is shown with equipment for preparing a compound to be examined spectroscopically. Acetylene gas from the cylinder at the right is reacted with a solution of sodium metal dissolved in liquid ammonia. Note the frost on the flask and condenser jacket (at left). A dry ice-acetone mixture is used to condense the ammonia.

DR. HUGH J. MCDONALD: *A versatile physical chemist.*

Dr. McDonald, who received his Ph.D. from Carnegie Institute of Technology, joined the chemistry staff at Armour in 1939. Since no graduate students in chemistry were available, Dr. McDonald's investigations on the separation of ethyl alcohol from glycerol were carried on with the assistance of an undergraduate, Mr. Ralph Petri. This investigation is significant since ethyl alcohol occurs as a by-product in one of the latest methods of making glycerine by fermentation processes.

By the next year there were graduate students in chemistry and two of these worked with Dr. McDonald. Mr. William McMillan extended the study of mixtures of organic liquids to include compounds which were then used in the dry-cleaning industry and in the degreasing of metals before painting or plating. Data were obtained which should be valuable in the design of equipment for industrial recovery of these highly useful solvents.

The other study, with Mr. Rudolph Frantik, was on the thermodynamic properties of alloys of silver and tin, which alloys find practical application in electrical work. A similar study was made of lead-antimony alloys.

The work on organic mixtures with glycerol was continued during the summer of 1942 with the help of Messrs. Kluender and Lane, who obtained data which may find application in the separation of impurities from glycerol.

A program of research in chemical kinetics has recently been initiated. Mr. Joseph Ziomek, working with Dr. McDonald, is studying the kinetics of the thermal decomposition of acetyl chloride. The elucidation of the mechanism by which some chemical reactions proceed readily, while others of somewhat like nature do not, has interested physical chemists for a long time. The problem is a complicated one; therefore, reactions which are chemically of a simpler type and whose course can be followed must be studied first.

Corrosion of iron and non-ferrous metals has received much attention during the last thirty years, but very little has been done in a study of the rates of such reactions and how they are affected by temperature. An interesting reaction involving the corrosion of copper is now being studied by Mr. Russell Lane and Dr. McDonald. Water in the Chicago area contains a considerable amount of sewage of a nitrogenous nature which on oxidation by the oxygen of the air apparently gives rise to traces of ammonia. When this water is used in steam power plants, it is found that considerable corrosion of copper parts takes place despite deaeration of the feed water by superheated steam and other methods. An attempt is being made to study the rate of the reaction of ammonia on copper, in solution containing various solutes and at several different temperatures. It is hoped that a knowledge of the mechanism of the reaction will lead to a specific anti-corrosion agent.

Mr. Morris Feller, with Dr. McDonald, is working on the corrosion of iron in aqueous solutions of ammonia. It is found that there is a critical concentration of ammonia below which oxygen corrosion takes place, but above which corrosion is inhibited. Thus, the presence of the proper concentration of ammonia retards the corrosion of iron and steel, but accelerates the corrosion of copper and copper alloys.

DR. HERBERT BERNSTEIN: *"Research is fun."*

Dr. Bernstein, a pupil of Prof. Whitmore at Penn State and a post doctorate National Research fellow at Princeton, joined the staff in the summer of 1941. His research before coming here was chiefly on the theoretical side of organic chemistry, especially that of molecular rearrangements. A theory which was developed to explain and predict the type of rearrangement under given conditions has been rather widely accepted by organic chemists, but experiments worked out this past year by Dr. Bernstein and Mr. Irving Goldstein, now in the Navy, have thrown some doubt on the generality of this idea.

For the duration, Dr. Bernstein has decided to center his attention on research as closely connected with the

Donald Long, holder of a graduate fellowship, employs an efficient fractionating column filled with glass helices to effect purification of compounds used in his work.

war effort as possible. Under his direction Mr. Donald Long is working on a fellowship sponsored by the Quaker Chemical Products Corporation. The search is for a new class of compounds for impregnating fabrics to make them water repellent. This type of work is of great interest to the Navy. Definite progress is being made in this project and several interesting compounds are being studied.

Mrs. D. P. DeLany and Mr. Louis Rothstein, under Dr. Bernstein's direction, are engaged in the preparation of new compounds which, it is hoped, will have pharmaceutical value. Some of the compounds are of the sulfanilamide type and others may have possible anti-malarial activity.

A whole new field appears to be opening up because of the work of Dr. Bernstein and Mr. Harold Pokras on organic compounds of phosphorus. Although the compounds thus far investigated are rather simple, they are new; consequently it is entirely too early even to make predictions as to their possible use in industry, war, and medicine.

Dr. Edward J. Bicek: *Everywhere he turns he sees research problems to solve.*

An important addition to the physical equipment of the research laboratories is the x-ray diffraction equipment being set up under the direction of Dr. Bicek. The assembly will embody a high intensity x-ray diffraction tube with beryllium windows and copper target. The diffraction apparatus will be especially designed for the purpose of obtaining diffraction patterns of cellulose and other natural or synthetic polymers with monochromatic x-rays using a vacuum camera and crystal monochromator. This work will be a continuation of the research started by Dr. Bicek in his doctoral thesis at the University of Illinois on the physical structure of polymeric substances. The importance of research of this type can hardly be over-emphasized in these times when plastics are playing such a large part in our economy.

The diffraction equipment will produce two beams of x-rays. The one not used for investigation of polymers will be employed for a variety of purposes. It is anticipated that powder diffraction patterns will prove of value in the characterization and identification of certain new types of organic compounds being prepared by Dr. Bernstein and his assistants. These compounds are difficult to characterize by the usual methods because of their insolubility in most solvents and their lack of usable melting points. Dr. Gibson also plans to make use of x-ray diffraction patterns in the identification of phases and intermediate products which arise in the solid phase reactions he is studying.

One of the newest applications of the high intensity, low voltage beams from tubes of this type is that of microradiography. Even the electron microscope has not taken over this field since it cannot handle specimens of any appreciable thickness. By means of the microradiographic technique it is possible to study the inner structure of opaque samples with a resolution approaching .002 mm. Dr. Bicek will continue with work he has already started in this field.

Dr. George Gibson: *An industrious ex-industrial chemist.*

Dr. Gibson, who obtained his Ph.D. degree from Brooklyn Polytechnic Institute, came to Illinois Tech from duPont at the beginning of this present session. His main research interest is the reaction of different compounds in solid mixtures at temperatures of several hundred degrees. A study of this type is not, by any means, the easiest in the world, for it involves accurate control of conditions and extraordinarily complicated methods of analysis. Dr. Gibson expects to begin assembling apparatus as soon as conditions warrant for study of the reaction between silica (quartz) and various carbonates.

At the present time he is testing a new method for the preparation of anhydrous hydrazine by thermal decomposition of various hydrazine phosphates. Although several methods for preparing this useful compound are known at present, they are rather troublesome and time-consuming.

Dr. M. L. Schultz: *Absorbed in absorption spectra.*

Dr. Schultz, Ph.D., University of Chicago, uses a spectrograph in his research to help him determine the arrangement of atoms in certain complex ions. When white light, that is, light made up of all visible wave lengths, is passed through certain solutions, some of the wave lengths (colors) are absorbed and the solution appears blue, green or red depending on which colors remain after the absorption. Spectrographic ex-

amination by a trained observer shows interesting details about the structure of the absorbing molecules or ions.

In carrying out this work on absorption spectra, Dr. Schultz has been assisted by T. Kowalski, E. F. Lilek, and V. C. Smith, all senior chemistry majors who, because of their ability, were invited to do undergraduate research.

Although the work is chiefly spectrographic, ramifications include the preparation of complex compounds, determination of their composition, the calculation of their energies of formation and the direct experimental measurement of thermochemical data.

In the near future Dr. Schultz plans to study the effect of temperature on complex ions by measuring the spectra of crystals at —196°C, which is the boiling point of liquid nitrogen.

DR. BRUCE LONGTIN: *Originator of "Gertrude", the mercurial aneroid calorimeter.*

In the design of processes for the purification of mixtures of organic liquids, such as those from which important chemical solvents are obtained, the chemical engineer needs data concerning the physico-chemical properties of these mixtures. These data include such properties as vapor pressures and solubilities, which indicate the relative ease with which the mixture may be separated. The data also include such properties as viscosities and the heat required for the separation, which determine the fuel and power consumption of the process.

When the mixture to be separated is one that has not been previously studied, the problem of the engineer would be much simplified if he could estimate the values of these important properties without having to wait for the results of laboratory experiments. So far chemists and physicists have not been able to supply the engineer with any equations which would accurately predict these values for any mixtures containing such important chemicals as the alcohols, organic acids, and other substances in which the forces between the molecules in the mixture are abnormal.

To fill this need, Dr. Bruce Longtin has been working to develop a theoretical treatment of solutions which would include the results of previous theories and at the same time give satisfactory results in these abnormal cases. While still in a preliminary stage, his latest attempts already show promise of solving a number of important theoretical problems as well as the original practical one of predicting physical properties. For example, it now appears possible to obtain information about the relative size and shapes of the molecules in a mixture, together with the forces between molecules, from data on the refractive indices or from the amounts of heat evolved in producing the mixture.

In order to fill gaps in the existing data needed to test his theory, Dr. Longtin is also carrying out experimental research to determine a variety of physico-chemical properties of solutions of organic substances. At present he is most concerned with determining the heats of mixing. In these studies it is important that the chemicals used be of unusually high purity, and the time required to purify the commercial chemicals becomes a serious problem when any large amounts are needed. With the assistance of Mr. Dwight Lincoln, who is finishing work toward the master's degree, Dr. Longtin has attempted to develop a calorimeter in which the heats of mixing could be measured with the use of only a few cubic centimeters of the mixture.

In attempting to reduce the amount of liquid needed, it occurred to him that if the thermometer could not be made small enough to fit into the small quantity of liquid, then why not make a thermometer with a well in the bulb large enough so that the liquid could be mixed in the thermometer, instead of putting the thermometer in the liquid. Such a thermometer, with a cup-shaped bulb, was constructed, and christened as the "mercurial aneroid calorimeter." This lengthy cognomen, which adequately describes the nature and purpose of the instrument in technical terms, was such a mouthful that Mr. Lincoln affectionately nicknamed it "Gertrude." Gertrude performed reasonably well through her preliminary trials until almost the last test had been passed, when she met an unfortunate demise, the result of her somewhat fragile construction and the physiologic effect of a stray electric current on the reflexes of one of her mentors. A successor to Gertrude, of very different design, is in the process of construction.

In addition to his work on the theories of solutions, Dr. Longtin has been interested in trying to unify the theoretical treatment of various rate processes including chemical reactions, flow of heat, electrical current, diffusion, and flow of liquids. He is also collaborating with Professor Merle Randall of the University of California in writing a book on Separation Processes, which he hopes may contribute to the solving of technical problems in such essential industries as the production of solvents and the manufacture of raw materials for synthetic rubber.

DR. M. J. MURRAY: *On the fence between the fields of Chemistry and Physics.*

The research partnership between Dr. Forrest F. Cleveland of the Physics Department and the author is now in its eighth year; during about half of this time the partners have been at Illinois Tech. The working arrangement has been described fully in the October (1942) issue of this magazine under the title "Research in the Department of Physics" by Dr. J. S. Thompson. This program of research is a study of the structure of molecules using spectroscopy — both Raman and infra-red—as a tool. The preparation and purification of the various compounds to be investigated are carried out in the chemistry research laboratories, and the spectroscopic work is done in the Spectroscopy Laboratory which is located in the Physics Building. Many of these compounds are closely related to acetylene and are best prepared using liquid ammonia at its boiling point (—33°C) as a solvent for the reactions.

By means of the Raman effect several acetylenic hydrocarbons were observed to change when exposed to air, producing a type of compound which was interesting spectroscopically. Mr. R. H. Saunders made a study of the kinetics of the absorption of oxygen in the hope that additional light might be thrown on the general problem of oxygen reaction on unsaturated compounds. It was found that mechanism of the oxidation was quite different from that of the oxidation of many other compounds that had been investigated.

Below are briefly described a few of the realms which the Cleveland-Murray axis and some of the graduate students in the Chemistry Department have invaded spectroscopically.

Almost everyone thinks of hydrocarbons as compounds that just won't mix with water. The surprisingly high solubility of certain unsaturated hydrocarbons in water when silver ions are present was investigated spectroscopically by Mr. H. J. Taufen. Rather marked effects on the spectra were shown and these correlated with the modern idea of structure.

Inter- and intra-molecular forces have also been investigated by Mr. R. H. Saunders, using the Raman effect as a means of gauging the extent to which these forces act in certain mixtures of solutions and in the pure compounds. Again the ideas obtained by spectroscopic study lent

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WE STILL MEASURE OUR FRESHMEN

By

WILLIAM C. KRATHWOHL

World War I was the first war in which the efficiency of an army was improved by means of simple paper and pencil tests. The size of the project, even then, and the necessity for speed demanded that the type of tests should be such that they could be scored quickly and accurately by clerks who knew nothing of the subject matter. This led to devising a type of test known as the objective examination where the answer consists either of one or two words, or can be indicated by making a mark or crossing out a symbol.

Because objective tests proved so satisfactory, elementary schools, secondary schools, colleges, and business firms began using them. Colleges found them particularly useful in helping students to get more out of their courses, to locate mental and even obscure physical disabilities, to provide vocational guidance, and to improve teaching. Armour Institute installed a testing program in 1936; it was among the first of the engineering schools to do so. In December 1938 a report on that program appeared in this magazine in the article "We Measure Our Freshmen." Since that time, methods of making tests and scoring them have improved a great deal. Our testing program, as its usefulness became recognized, expanded until now it has become one of the indispensable tools for properly carrying on the work of the Institute.

As with other new devices, improvements in tests came slowly at first and then began to gather momentum. Even during the period since the Institute began its program, the content and the form of the tests have changed. No only do the new tests measure more accurately the things they are supposed to measure, but a greater variety of information can be secured about a student in a shorter time. The greatest advance made recently was the invention of machines to score tests. These machines can score and check three hundred answers in less than six seconds. Hand scoring, at its best, requires days and weeks to do what these machines can do in a matter of hours. By the use of these machines we have been able to gather more data about our students and organize this information more quickly so that it becomes effective in the first few weeks of the term when it is of greatest help to the student.

Since the Institute began its program these changes have come so rapidly that our present program has been materially altered to keep up with the latest improvements. The present battery of tests comprises: (1) Psychological Examination, which measures mental ability at the college level, (2) Reading Comprehension, which includes vocabulary, (3) Mathematics Aptitude, to measure mathematical ability, (4) Mathematics Preparation, to measure mathematical training, (5) Minnesota Paper Form Board, to measure visualization, (6) Mechanics of Expression and Effectiveness of Expression, to measure English training, (7) Chemistry, to measure chemistry training, and (8) Information Quiz, to measure general information. An inspection of this list shows that we are now getting information not only on the abilities of our students, but also on the training which they received before coming to college. The latter information is of great help in planning the content of some of the freshman courses.

One of the changes made was in the first test mentioned, the Psychological Examination. This examination is now constructed to yield two scores. One of these scores measures quantitative thinking like the kind one does when dealing with numbers or abstract things. The other score measures language thinking, or the kind of thinking which is done with words. It is of interest to note that we have found our average freshman usually has a higher quantitative score than language score, and this seems to be characteristic of the average engineer. The superior and the poor freshman, however, do not seem to follow any rule. This is reasonable since it is found that superior students can do almost anything well, and poor students do as poorly in one kind of thinking as in another.

This Psychological Examination has been a source of great gratification to the Institute in showing that we naturally draw most of our students from those of superior mental ability. Each year since 1937 our national standing has been in the upper quarter, and one year it rose to the upper thirteenth.

One of the new uses found for the testing program has been to section students in classes according to ability. The Mathematics Department was the first to do so by preparing a test on arithmetic and elementary algebra. This test was adapted to machine scoring, and the following illustrations show the form in which questions have to be put.

No. 5. $\frac{2}{3} + \frac{4}{5} = (1)\ \frac{6}{8}$; (2) $1\frac{7}{15}$; (3) $\frac{8}{15}$; (4) $\frac{6}{15}$; (5) All suggested answers are incorrect.

On the answer sheet for this question are five pairs of parallel bars as shown in Figure 1, and the student has to blacken the space corresponding to the correct answer. In this case number 2 was the correct answer and hence the space between the second pair of parallels is blackened.

Figure 1.

It would seem that no student intending to enter an engineering school could miss this question, but such was not the case, since only 86% instead of 100% answered the problem correctly. 6% chose the first answer, 2% chose the third, no one chose the fourth, and 6% said that no one of the four suggested answers were correct. It would be interesting to know what

answers the last 6% thought were right.

Although this was the easiest problem in the examination, its difficulty was increased a great deal by changing the denominator to letters. This was done in No. 17.

No. 17. $\frac{3}{p}+\frac{3}{q}=$ (1) $\frac{6}{p+q}$;

(2) $\frac{3}{p+q}$; (3) $\frac{3(p+q}{pq}$; (4) $6(p^{-1}+q^{-1})$

(5) All suggested answers are incorrect.

In this problem only 44% selected the correct answer, which was choice (3). Almost as many, 37%, chose (1) where the numerators and denominators are added separately: 9% selected (2), 2% selected (4), and 8% selected (5).

Exponents always cause difficulty to freshmen and the second hardest question on the examination turned out to be

No. 6. $2^{100}+2^{100}=$ (1) 2^{200};
(2) 4^{100}; (3) 4^{200}; (4) 2^{101};

(5) All suggested answers are incorrect.

The correct choice (4) was made by only 6%. Choice (1) was chosen by 18%, choice (2), the most popular, by 46%, choice (3) by 14%, and 16% stated that none of these answers were correct.

Making up examinations of this kind requires a good deal of thought. The difficulty in their construction lies in knowing what wrong answers students will make, and this knowledge is available only to an experienced teacher. Nevertheless, even the experienced teachers were quite disconcerted to find their misleads in the Mathematics Preparation test frequently passed up in favor of the fifth choice, "all suggested answers are incorrect," which appeared in every problem. It seemed that the students could think of more wrong answers than their professors could. An effort was made to find out what answers were in the minds of the students who made this choice. The result was interesting because it turned out in the majority of cases that, although the students were sure the suggested answers were incorrect, still they could not say what they thought the right answers should be.

Besides the placement test in mathematics, there have also been placement tests in English and chemistry. All of these have been added at the request of the departments concerned.

The general scheme in the English tests is to see if a student knows grammatical usage, punctuation, capitalization, and spelling, and to find out if he can organize his thoughts so as to write a good letter or report. Since this test is machine scored, the English instructors know before the course has begun which students need extra help on their English.

The Chemistry test distinguishes the students who have had satisfactory chemistry courses in high school from those who have not. At present, experiments are being carried on with the information secured from this test to find how time may be saved for the better students and to eliminate needless repetition.

The science test in the 1938 battery has now been replaced by one called the Minnesota Paper Form Board. This test gives an idea of a person's ability to visualize; engineering students do better on it than the average liberal arts student. A question similar to one of those on the test is given in Figure 2.

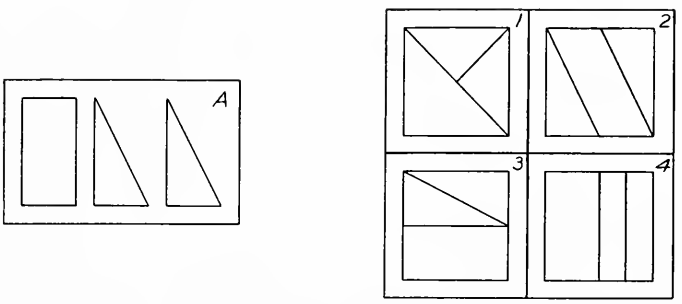

Figure 2.

The part marked "A" contains three figures. The student is supposed mentally to move these around and, if necessary, turn them over to see if they will form parts 1, 2, 3, or 4. The answer, of course, is part 3.

Entering freshmen show a wide range of ability on this test. In September, 1942, one student made the maximum possible score of 64, but two made a score as low as 20.

One of the most interesting of the experimental tests is called Information Quiz, of which three different forms so far have been given to the freshmen. The test tries to indicate the kind of information a student possesses, to show how conscious he is of the world in which he lives, and to measure the breadth of his reading. Some students are so interested in engineering that they live in a world surrounded by engineering books and magazines. Such a type rarely rises to an executive position. While wide reading knowledge is not the only requisite for success, still, if a student will broaden his reading, he may find that this is a very interesting world in which to live.

Samples of questions on these Information Quizzes are given below. The numbers after each question give the per cent of students who answered it correctly.

Sample Quiz Questions

1. If two pieces of ice in the sunlight are covered with cloth, one with white cloth and one with black cloth, which will melt faster? (93)

2. With what river do you associate Mark Twain? (86)

3. Who wrote the words of the Star Spangled Banner? (75)

4. In a regular nine-inning baseball game, if the home team makes two runs in each inning, and the visiting team makes one run in each inning, what is the score at the end of the game? (74)

5. From what poem was the following line taken: "Water, water, everywhere nor any drop to drink"? (39)

6. What is the meaning of the Latin phrase, "Tempus fugit."? (38)

7. In what state did Lincoln deliver his Gettysburg address? (37)

8. The charge of the Light Brigade was against what country? (36)

9. To whom does the pronoun refer in the poetic lines,

"Then he said, 'Good night,' and with muffled oar
Silently rowed to the Charlestown shore."? (27)

10. What famous p h i l o s o p h e r walked through the streets of Athens, asking questions? (20)

If you wish to see how good you are, you will find the answers to these questions at the end of this article.

These quizzes give an interesting sidelight on what entering engineering freshmen knew. Questions involving science and sports usually were easy, whereas questions involving geography, history, and poetry proved to be quite difficult. Scores varied widely. For instance, in the 1940 edition, with a possible maximum of 50, the highest and lowest scores were 41 and 4 respectively. In the 1941 edition of the same length, the range was from 46 to 12.

Studies based on the orientation tests have given some interesting and worthwhile information. For instance, a study made of two graduating classes showed that for at least two of the tests, the Psychological Examination and the Mathematics Aptitude Test, there was a definite line of demarcation below which no student ever graduated. If it can be shown that this is the actual condition of affairs and not an accident for the two classes, then a great deal of time and energy may be saved for students who should attend a different type of college.

One of the most interesting results has come by comparing grade averages of a class with averages from some of the orientation tests. The grade averages were obtained by taking the class of an instructor, assigning a numerical value of 3 for an A, 2 for a B, 1 for a C, 0 for a D, and —1 for an E. These were added and the sum divided by the number in the class. If the result turned out to be 1, then the average grade given by the instructor to that class was C.

Similarly, the scores on some orientation tests were averaged using Derived Scores. Such scores computed on the entire freshman class have a mean of 20 and a standard deviation of 4. If the average of the class turned out to be 20, then this class had the same average ability on this orientation test as the entire freshman class. For some tests there seemed to be a relation between average grades and average test scores; for others, as might be expected, there was not.

A pair which did correlate quite well were average grades in freshman mathematics and average mathematics training scores as measured by the Mathematics Preparation Test. The result is shown in Figure 3. Here each symbol represents the class of some instructor. The black circles represent classes in the day school, the plain circles are classes in the evening division, and the crosses are classes of cooperative students. The classes with higher average grades are toward the top. Those with higher average training scores are to the right. Only those classes are shown which were taught by the regular full-time staff. The straight line in the diagram is the line which passes closest to these points. Alumni of the Institute will undoubtedly recall how, in their course in Analytic Geometry, they computed equations of such lines by the method of least squares.

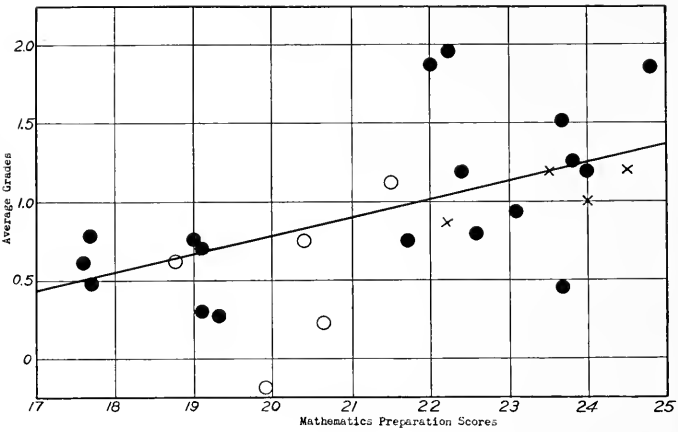

Figure 3

It is seen from this figure that the cooperative classes had better high school training than the other classes. This is a result which might be expected since the cooperative students are a very carefully selected group.

What was not known in advance was that the evening students would show poorer preparation than the day students. One explanation is that evening students often allow several years to intervene between leaving high school and entering evening classes so that they forget much of their algebra. The fact that their average grades are lower can be explained by the load most of them are carrying. To work full-time during the day and do successful evening work requires a considerable amount of extra energy. This figure shows also why it is much more difficult to teach evening classes than day classes. The problem now becomes one for the administration to solve. It consists essentially of deciding how much review work is necessary and with what speed the class can travel so that evening students can get as high grades as day students. At present, experiments are under way in an attempt to solve this problem.

The black circles clustered at the left of the figure are the second term slow classes in freshman mathematics. These classes, which were selected by means of the Mathematics Preparation Test, attempt to do in three terms what classes with the better trained students do in two.

These illustrations show how a carefully worked out orientation testing program may be of help both to students as individuals and to the institution as a whole. Not only may it assist a student in his personal difficulties, but it may also indicate broad educational trends and policies.

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HEALD AND GRINTER ASSIST WMC

Dr. L. E. Grinter, dean of the graduate school and vice-president of the Institute, has been appointed consultant to the bureau of training of the War Manpower Commission. His duties are to advise the commission on matters relating to technical education and on the problem of making a sufficient number of engineers and technically trained persons available to war industry. Dean Grinter spends a part of each week in Washington.

President Heald is acting in a similar consulting capacity for WMC. He is also consultant for the training division of the Bureau of Navy Personnel, and for more than two years has been regional adviser for Engineering, Science, and Management War Training and for the Engineering Defense Training organization which preceded ESMWT.

YELLOTT RECEIVES AWARD

For the second time in three years, the distinguished service award of the Junior Association of Commerce of Chicago has come to a young man at Illinois Institute of Technology.

Annually awarded to the young man whom the Association deems to be the outstanding Chicagoan under thirty-five, the 1943 award has been presented to John I. Yellott, director of mechanical engineering and chairman of the war training committee at the Institute.

The 1941 award was presented to President Henry T. Heald of Illinois Tech.

Prof. Yellott followed in the footsteps of President Heald on Jan. 21, 1943, for it was on this evening that he was presented with the distinguished service award. On this occasion, Prof. Yellott was honored at a banquet held at the Chicago Bar Association and attended by more than 300 persons.

Presentation of the award to Prof. Yellott was the climax of the evening, when A. M. Sprowles, chairman of the committee to select Chicago's outstanding young man of 1942, cited the reasons why the Illinois Tech professor had been chosen as the recipient of this honor.

Mr. Sprowles spoke as follows:

> This is the 12th year the distinguished service award has been given by the Junior Association of Commerce. Last year, in lieu of an individual award, a plaque was dedicated to the thirty-five men of our organization in service. The year before, Dr. Henry T. Heald, president of Illinois Institute of Technology, was named the recipient, and this year another member of that school is to receive the award.
>
> We look forward eagerly to this occasion each year, as it presents an opportunity for us to pay tribute to the accomplishments of men within the age limits adopted by our own organization.
>
> The distinguished service award key is awarded to the recipient on the basis of his personal character and ability, and outstanding civic and patriotic service beyond the line of duty during the year, which has contributed directly or indirectly to the welfare of Chicago or the nation entirely.
>
> To fulfill these requirements is a far more difficult task than most of you can surmise. However, the qualifications of the candidate selected for this year's award far exceeded these requirements and made it possible for the board of judges to conclude their selection in record-breaking time.
>
> The accomplishments of Prof. Yellott were several and entirely distinct in their purpose and function. He has willingly assumed sole responsibility of programs and projects, and carried them through to successful conclusion, where men of less resolution would have fallen short of their goal or, more likely, failed entirely. Prof. Yellott could have been named the award winner on the basis of any one of these accomplishments which I should like to enumerate for you briefly.
>
> With no compensation involved, he gave much of his personal time in arranging the ground work of the Job Instructor Training program for the War Manpower Commission. The procedures and techniques resulting from his efforts on this program have been adopted as a model for state regulations in Illinois, Indiana, and Wisconsin,
>
> By promptly organizing an educative force and outlining the proper curriculum to train the staff, field men, and safety representatives, he has enabled the safety and security branch of the War Department Ordnance Office to operate effectively. Their responsibility is to make safe and secure the operations of manufacturing, processing, and storing of high explosives throughout the many munitions plants of our nation.
>
> As a matter of fact, the chief of that office has expressed his belief that they could not have operated had it not been for Prof. Yellott's foresight and expedient efforts. When Washington heard of his success with this program, he was

Mr. Sprowles presents award to Professor Yellott (right)

Chicago Times Photo

asked to organize a school for safety auditors. This was done, and now the explosives safety school has the task of training experts to cover all of our nation's more than 600 munitions plants. Prof. Yellott is continuing to help the War Department to operate these schools in a supervisory capacity.

He organized the first program designed to train women for specific technical war jobs. His classes were begun in March, 1942, before the national clamor for technically trained women had reached its peak. More than 600 women have been trained in ordnance inspection, industrial chemistry, engineering drafting and metallurgical techniques. These women now form an important part of our war industry.

He organized the first Ordnance Inspection School in the nation, and Illinois Tech had 300 graduates ready for duty when the Chicago Ordnance District entreated the school to begin training men for this field. He has built this program to the point where now Civil Service pays trainees to prepare in this field.

He organized the first program in the nation to train the "white collar" man so that his peace-time talents could be of use in the war effort. Ninety-four men have completed this training, and 200 are presently enrolled. His plan for this training has been put into effect by many other institutions. He took the responsibiliy for industrial safety in the Chicago area at the request of a committee appointed by President Roosevelt for the conservation of man power in war industry. Over 480,000,000 man days were lost to industry last year through accidents. This does not take into consideration the damage of machinery and waste of materials. This was a serious problem to the nation's war production—something had to be done and quickly.

He organized a safety program so large that its 1100 trainees represent one-fourth of the national total. His program was so successful that the Department of Labor simply adopted his safety training system as a standard instruction procedure from entrance requirements to class lessons for the entire nation.

He set up a feeder program for the Signal Corps school at Illinois Tech which is the largest and most advanced in the Sixth Service Command. His program has aided in keeping 2600 Signal Corps technicians in training at all times.

He has provided the fountain from which flow the necessary technicians for virtually every new war plant in Chicago, thus making it possible to begin their operations in this area.

He set up a program which trained more than 600 men for the Buick plant here before operations were commenced.

He has constantly been on the lookout for opportunity to make his educational programs of more service to Chicago's war industries, notwithstanding the fact that he has been largely responsible for developing the finest, most efficient war training program in the country.

The fact that Prof. Yellott has directed the training of more than 22,000 war technicians since Pearl Harbor dwarfs all other facts.

All of the foregoing statements relate to Prof. Yellott's activities beyond the line of duty in which, as director of mechanical engineering at Illinois Tech, he is assuming the responsibility of training engineers where America's most critical manpower shortage is represented.

On behalf of the Junior Association of Commerce, I consider it an honor to present this year's key award for distinguished service to a man who has given unselfishly of his time and diligent efforts, and has actually contributed more to the home front effort than any individual or any institution in any field in the Chicago area.

Prof. Yellott has been a Chicagoan but little over two years. He came to the Institute in 1940 to be director of the department of mechanical engineering. In 1941 he was given the added assignment of heading the war training committee.

Being commended for having made the "outstanding civic contribution" in Chicago is not the first important award won by this young engineering scholar. He was selected by Pi Tau Sigma, honorary mechanical engineering fraternity, as the outstanding mechanical engineer of the past decade in 1939.

And in 1934 he received an award from the American Society of Mechanical Engineers for presenting the outstanding paper of the year to that society.

Prof. Yellott is a graduate of Johns Hopkins University, having received his masters degree there just a decade ago in 1933. He received his bachelors degree in 1931.

Prior to coming to Illinois Tech, he was a professor of mechanical engineering at Stevens Institute of Technology in Hoboken, N. J., from 1934 to 1940. Before this, he was an instructor in engineering at the University of Rochester in Rochester, N. Y.

Yellott's Address

Professor Yellott's acknowledgment of the award follows:

It is unnecessary for me to say that I am deeply appreciative of the honor which you and your distinguished committee have bestowed upon me. This award came to me as an almost complete surprise, since my worthy colleagues systematically kept me in ignorance of the entire proceedings. Paul Mertz, however, with his customary thoroughness, addressed to me a copy of his very generous letter to your committee, and I was thus apprised of the remote possibility of following in the footsteps of my esteemed superior, President Heald, who received your award two years ago. Following in those particular footsteps is no easy matter, I may add, since President Heald walks with a long stride in affairs both local and national.

Your award is highly regarded by the city of Chicago. Your committee has seen fit to confer it upon me, and I accept it with a deep sense of humility and responsibility. Humility, because the accomplishments upon which the award is based would have been impossible without the untiring and intelligent work of my associates in the administrative staff and the instructional force of the War Training Program of Illinois Institute of Technology. This award is a token of the value which the community places upon our Program, and my fellow workers know how deeply their loyal cooperation is appreciated.

Your award confers upon its recipient a large responsibility—any such honor once bestowed obligates the receiver to prove by his future service to the community that the committee has not erred in its choice—responsibility also because the War Training Program has been financed by funds applied by the Federal Treasury, which is simply another name for you, the people of Chicago and the Nation.

It is a particular pleasure to me that for the second time in three years, your award has been given

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THE WEST SIDE CAMPUS AND THE WAR

By
CLARENCE L. CLARKE

Bluntly stated, every college from now on out is a war plant. Its production is concerned with building the skills and the abilities which will contribute the utmost to the successful accomplishment of the grim task that America faces. Lewis Institute of Arts and Sciences of the Illinois Institute of Technology, true to its traditions and its performances during World War I, has been "converted" onto a war basis, as have many other essential industrial plants.

It is the purpose of this article to give the alumni and friends something of a picture of what is going ahead at Lewis. A brief portrayal can not avoid quantitative statements, for the extent, variety and complexities of the programs being carried on cannot be sensed without using some statistics. These, however, will be kept to a minimum. And they can be accurate for only one moment, for change and development occur whenever a shift in critical needs for trained men and women is reported or anticipated.

The semester just finished witnessed an enrollment in the regular day session of Arts and Sciences approximately the same as a year ago. Five hundred young men and women completed their autumn schedules. On the average they carried heavier programs than the year previous. Not a few carried twenty hours of work. Many selected their schedules with more seriousness of purpose and with closer relation to the most probable needs for the more immediate future. For the term beginning February 8th, besides the regular programs offered, for such as age and other conditions make feasible and desirable there are offered opportunities for a choice of one of a score of different special war-training curricula. To complete one of these outlined trainings will take sixteen weeks to twenty-eight months of resident study. The length of training varies from program to program and within a program depending upon the

A student gets acquainted with the unique set of kitchens in Illinois Tech's department of home economics. The unit includes four kitchens, each being equipped with furnishings of different price levels. The purpose of the unit is to give home economics students training with household equipment representative of the nation's different income brackets.

The garage which has been "drafted" for service on the west campus holds class sessions such as these in Signal Corp training. The garage was remodeled to accomodate the huge volume of war training students.

level of work for which the student plans to prepare. Each aims definitely at producing competency and employability in the war effort or where there are critical shortages in the civilian, industrial or armed forces, including the women's war auxiliary corps. Every one of these training programs is available to both women and men, who are at least high school graduates, except one which is specifically planned for women, the War Welfare Services.

It is hoped that these special programs will contribute definite aid to the war effort in not too remote a future. It is expected that they may be the means of helping some young people to achieve the sense and satisfaction of personally participating in America's mighty efforts. Incidentally, the courses are organized and planned to be of such caliber and quality that satisfactory completion of them will count towards the requirements for a degree for such persons as later may desire to complete their college work.

Besides the programs and the activities of carrying them forward in the regular day and evening school, Lewis houses and nurtures a maze of other educational activities, efficiently organized and continuously carried forward with outstanding success. There are at least eleven other projects going on, each with its specific curricula, no two of which commence or end, except quite by accident, on the same calendar dates. The length of time used for any one is determined solely by how long it takes to train into the competency aimed at. Each type of training is for a skill or ability crucially needed by industry or the armed forces.

There are nearly one hundred thirty specific Engineering, Science, and Management War Training courses, sponsored by the United States Office of Education, conducted by six of the metropolitan colleges and universities. For the conduct of nearly forty of these courses, Lewis provides class rooms, laboratories, and other educational facilities for at least one section. Dean Fred A. Rogers is the director and supervisor of these projects at Lewis. The standard length of these courses is sixteen weeks; some of them

may be followed in the next term by a more advanced course if a person and his or her employer so desire. The frequency of class meetings varies from one to four two-hour periods per week, depending upon the requirements for the training. Most of these courses are in the evening. However, some meet during the day if the employed students are on a night shift. Among the purposes of these courses are the upgrading of workers already employed, preparing "displaced" workers for usableness, and preparing individuals for new industrial demands caused by the rapidly changing methods, processes, and materials in some war plants.

Another activity has to do with training women for war industries or the ordnance department. Already nearly a thousand women have received certificates for successful completion at Lewis of some one of several courses of training requiring forty hours of class and laboratory work per week for a period of from ten to sixteen weeks. The variations in length are due to the objective sought or to the finding, through experience, that the time could be shortened a week or two. The graduates of these courses are found actively employed in war industries, civil service work, and in other essential services where the growing demand for trained women occurs. These women's war training programs are a part of the E. S. M. W. T. project sponsored by the United States Office of Education.

The single largest unit of training for war at Lewis is that being done for the Signal Corps. There are several parts in this program. However, they are related. All are alike in that the student load is forty-eight hours of class and laboratory work per week. The magnitude of this task appears when one considers that for times of peak load, the instruction delivered has amounted to over seventy-nine thousand student hours per week.

From their inauguration, all of these programs have been as continuous as good management could make them. The graduation of one group of trainees has been followed by the admission of another group. Holidays and vacations have been kept to the minimum. Last Memorial Day, Fourth of July, and Christmas day were school days of regular work for some of the programs. The only holiday enjoyed by the Signal Corps students since that project started about ten months ago has been New Year's day. They do, however, have Sundays away from school, used, we suspect, for "catching up" on their home work.

For a concrete picture of the activities going on at Lewis at any one time we are indebted to Mr. Paul O. Ridings, director of the I. I. T. News Bureau, who had his assistants survey the Lewis plant and visit the various offices this autumn for data on the projects they were conducting. Their findings he has summarized somewhat as follows:

"There's always room for one more" is an adage now antiquated. "There's always room for one thousand more" is more appropriate, so Illinois Institute of Technology's officials have proved at their west campus, 1951 West Madison Street.

This building, originally constructed in 1895 to house Lewis Institute, has gone to war. With facilities originally meant for a maximum of 1,000 to 1,200 persons, it now serves as the training headquarters for 5,888 persons. Only 1,327 of these are regular college students—the rest are war training students. Included in the remainder are 564 women who are being trained to go to war as technicians at the expense of the U. S. Office of Education. Another 2,166 men and women are being given free war-training courses under the Engineering Science and Management War Training program. One thousand eight hundred and thirty-one men are being given radio training for the U. S. Signal Corps. And it all sums up to the fact that approximately six people are being trained in the space it was once thought could accommodate only one. To do what might seem an impossible job, classes are held seven days a week and at all hours of the day and night. The inspection laboratories, the drafting rooms, and the machine shop, are among the units which are in service seven days a week. Both the inspection laboratories and the drafting rooms are in use fourteen hours a day, from 8 a.m. to 10 p.m., every day but Sunday, and on Sunday they are in service from 9 a.m. to 6 p.m. The inspection laboratory was built for 300 students; it now accommodates 850. The steam laboratories were converted into three additional drafting rooms. Every nook and cranny of space is being utilized.

In the radio training program, classes begin at 7:30 o'clock in the morning. And, on occasion since Pearl Harbor, some labs on the west campus have been in use all around the clock, 24 hours a day; however, no such activities are on now. The auditorium, once used only for student assemblies and dramatics, is now used for classes at least twelve and one-half hours every day, and on Monday it is in use for fourteen and one-half hours. These classes have from 150 to 400 or more in attendance. The Signal Corps uses a large section of the library which formerly housed stacks of books. Art classes meet in a former art supply storeroom. The art room has been turned over to government classes for blueprint reading and drafting. Regular science classes at Illinois Tech meet in their laboratories to release their lecture rooms for war training. The psychology department likewise holds classes in its laboratories.

In the basement, storerooms and rooms that have held discarded equipment have now been revamped into class rooms. And here a double war service has been performed—the old equipment has been donated to the scrap drive. Rooms which were not being put to their maximum use are being remodeled for war training. Unless regular college credit classes had large enrollment, they were cancelled this fall so that every corner could be used to capacity. The ceramics laboratories have now become visual education class rooms and provide an overflow lunch room. A hydraulics laboratory of other years is now a materials testing laboratory for women. Classes are even held in the home economics department tea room and in the faculty dining room. Rooms designed to hold 20 persons are housing 35; those built for 25 now are packed by 50. Temporary partitions are erected in the large class rooms when there is no call for a space for 100 students so that the room may accommodate two groups of 50 or perhaps three of 30 in these periods.

Peak load comes on Monday nights between 6 and 8 o'clock when every class room and every laboratory on the west campus is in use. To prevent congestion, classes are held on a staggered schedule so that all students will not be in the halls or lunchrooms at the same time. Even so, the school cafeteria can handle only a small portion of the students at lunchtime. To meet the shortage of dining room space, a ceramics laboratory has been remodelled to accommodate the overflow. Also the home economics apartment serves as an overflow lunchroom.

Needless to say, office space for the faculty and staff who direct the training of this group of 6000 is no small problem. Regular faculty members have willingly given of their office space to accommodate the war-training staff. One physicist is in one-fourth of his office; five war-training faculty members occupy the other three-fourths of the office. Other regular faculty members have moved to make room for the newcomers. The present mathematics office is a former storeroom for the art department. The political science faculty uses what

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HOWARD M. RAYMOND

Howard Monroe Raymond, second president of Armour Institute of Technology, died at his home in Grass Lake, Michigan, January 24, 1943, at the age of seventy.

Dr. Raymond was born October 25, 1872, on a farm five miles east of Grass Lake, which has been in the family for several generations. He was the only son of Morton L. and Mary Geraldine Raymond. His early education was in the nearby district school and the Grass Lake High School. Later, he entered the University of Michigan, where he received his degree of bachelor of science in electrical engineering in 1893. At the university he was active in athletics, in the engineering societies, and in dramatics. After graduation he was employed in the engineering department of the Rockford Electrical Manufacturing Company, where he remained about a year, returning to Michigan for graduate study in physics and electrical engineering in 1894 and 1895.

After serving for a short time as director of the Manual Training School at Ishpeming, Michigan, he became instructor in physics at the Institute in 1895.

During his thirty-seven years of active duty at Armour he was successively assistant professor, associate professor, and professor of experimental physics; director of evening classes, and dean of engineering. For four years he was principal of the Armour Scientific Academy (discontinued in 1903). After the death of Dr. Frank W. Gunsaulus in 1921 he became acting president; in 1922 he was elected president. Dr. Raymond served also as a trustee of the Institute and a trustee of Armour Mission.

On account of impaired health he retired from active service in 1932, continuing until his death to be honored as president emeritus, first of Armour, and then of Illinois Institute of Technology.

He was awarded the honorary degree of doctor of science by Colorado School of Mines in 1922. Dr. Raymond was a member of Phi Delta Theta and Tau Beta Pi; a fellow of the American Association for the Advancement of Science; and a member of the Society for the Promotion of Engineering Education. While his home was in Chicago he was a member of the Western Society of Engineers and of the University Club. He served as editor-in-chief of the *Cyclopedia of Modern Shop Practice,* the *Cyclopedia of Engineering,* and the *Cyclopedia of Mechanical Engineering.*

During his residence in Grass Lake, after his retirement, Dr. Raymond was active in the affairs of the Farmers Club, of which he was president for several years; president of the Board of Education for five years; and active in the affairs of the Methodist Church.

His biography appears in *Who's Who in America; American Men of Science; Presidents and Professors in American Colleges and Universities; Cyclopedia of American Biography; Who's Who in Michigan; Who's Who in American Education;* and *History of Michigan* (vol. IV).

Dr. Raymond was married June 21, 1898, to Carrie Smith. He is survived by Mrs. Raymond, and by their daughter Dorothy Geraldine, whose husband is L. Dean Alber, Armour F.P.E., '26. There are two grandchildren, Sally and Jacquelyn Alber.

TECH RELAYS

The Illinois Tech Relay Games will not be a war casualty.

John J. Schommer, director of athletics, has announced that the games will be held as usual this year. The date is Saturday, March 13.

Decision to hold the games as usual was prompted by a request from the Western Conference and allied major universities that the event be continued. The track coaches at these schools, as well as at several smaller colleges, urged Mr. Schommer to continue the games as an aid to the nation-wide physical fitness program. They pointed out that if the Illinois Tech Relays were continued, the possibility of competing in them would encourage boys to participate in indoor track.

Continuation of the Relays will definitely place the Chicago meet as the largest indoor collegiate track meet in the nation. Other large indoor track meets, such as the Butler Relays, have been forced to cancel their 1943 events because of war-time problems. The same factors which inspired Schommer to create the Games in 1928 have made it possible for him to continue the Relays despite the war-time problems.

"Chicago," thought Schommer in 1928, "is the natural spot for a great relay games meet; it is conveniently and centrally located; it is an outstanding place to bring the boys, who always enjoy a trip to the city, and it gives every track team in the country an opportunity to appear before a large group of its alumni."

His vision has proved true. The Illinois Tech Relays have grown from a three-team meet in 1928 until now an average of thirty-five to forty teams compete in the event. Last year thirty-seven teams, twenty-seven colleges and ten universities, were entered in the relays. A fourteen-year gross summary of the meet reveals that more than 400 individual teams and more than 5000 athletes have competed in the games.

Since 1935 the Relays have been divided into two classes of competition, college and university. As a result, the meet has been characterized by track authorities as the "only middlewestern meet in which colleges and universities can compete without the killing competition of an open meet."

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MIDWEST POWER CONFERENCE

APRIL 8-9, 1943
PALMER HOUSE, CHICAGO

The Directorate of the Midwest Power Conference cordially invites you to attend the 1943 meeting of the Conference on Thursday and Friday, April 8-9, at the Palmer House, Chicago. The success of the annual meetings of the Conference is evidenced by the 1500 individuals who attended the 1942 meeting and by the increasing demand for its published proceedings.

If interested in any phase of the field of power, you should not fail to attend the 1943 meeting. The Conference will be a stimulus to you—your presence will be a stimulus to the Conference. You know that POWER MEANS VICTORY.

The preliminary program of the 1943 meeting is given herewith. Inspect it carefully. It features an array of the best-known men in the field of power. You will want to hear them, know them, and enter into the discussions of their talks.

Preliminary Program

Thursday, April 8, 1943

9:00 A.M.—Registration, Palmer House

10:15 A.M.—Opening Meeting. H. O. Croft, Chairman

(a) Address of Welcome. H. B. Gear, Vice President, Commonwealth Edison Company, Chicago.

(b) Response for the Cooperating Institutions. M. P. Cleghorn, Professor of Mechanical Engineering, Iowa State College.

(c) Electric Power Supply. C. W. Kellogg, President, Edison Electric Institute, New York.

(d) Practical Education in War Time. Philip W. Swain, Editor of *Power*, New York.

12:15 P.M.—Joint Luncheon with A.S.M.E. J. R. Michel, Chairman.

2:00 P.M.—Central Station Practice. R. K. Behr, Chairman.
(Sponsored and arranged by the Power and Fuels Division, Chicago Section, A.S.M.E.)
Arrangements pending.

3:45 P.M.—Electrical Distribution. Session No. 1. J. E. Hobson, Chairman.

(a) Application of Shunt Capacitors to Meet Emergency War Conditions. Chas. F. Wagner, Manager, Central Station Engineering, Westinghouse Electric and Manufacturing Co., East Pittsburgh.

(b) Application of Ground Fault Neutralizers. W. A. Lewis, Director, School of Electrical Engineering, Cornell University.

(c) Design of Direct-Current and Low-Frequency Bus Systems; A Review of the Literature. Thomas J. Higgins, Associate Professor of Electrical Engineering, Illinois Institute of Technology.

(d) Discussion.

3:45 P.M.—Industrial Power Plants. H. L. Solberg, Chairman.

(a) Use of Automatic Control to Increase Plant Capacity. H. H. Gorrie, Design Engineer, Bailey Meter Co., Cleveland.

(b) Turbine and Boiler Outages. D. B. Jones, Hall Laboratories, Inc., Pittsburgh.

(c) Discussion

6:45 P.M.—"All Engineers" Dinner. Informal. Red Lacquer Room. (Ladies invited)
Toastmaster: James D. Cunningham, President, Republic Flow Meters Company, Chicago.
Speaker: Colonel James L. Walsh, Chairman, War Production Committee, The American Society of Mechanical Engineers, New York. "Logistics, The Science of Survival."

Friday, April 9, 1943

9:00 A.M.—Plant Protection. John I. Yellott, Chairman.

(a) Accident Prevention in Public Utilities. Major Ralph W. Applegate, C.E., Chief, Industrial Safety Branch, Sixth Service Command.

(b) War Time Protection of the Power Plants. Lt. Colonel A. G. Coulson, O.D., Chief, Continuous Security Branch, Sixth Service Command.

(c) Discussion.

10:30 A.M.—Plant Maintenance. R. W. Jones, Chairman.

(a) Breaking Bottlenecks in Piping Materials. G. W. Hauck, Manager, Engineering Sales, Crane Co., Chicago.

(b) Boiler Maintenance Under War-Time Conditions. A. C. Foster, Manager, Service Department, Foster Wheeler Corporation, New York.

(c) Discussion.

12:15 P.M.—Joint Luncheon with A.I.E.E. J. C. Woods, Chairman.
Speaker: F. W. Hollister, Chief Electrical Engineer, Sargent and Lundy, Chicago. "Conservation in Design."

2:00 P.M.—Electrical Distribution. Session No. 2. F. D. Troxel, Chairman.
(Sponsored and arranged by the Power Group, Chicago Section, The American Institute of Electrical Engineers)
Arrangements pending.

2:00 P.M.—Diesel Power. Hugh E. Keeler, Chairman.

(a) Heavy-Duty Stationary Diesels. B. V. E. Nordberg, Executive Engineer, Nordberg Manufacturing Co., Milwaukee.

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BETTER MOUSE TRAPS

Action within a store window or other closed space has always attracted the interest of passers-by. It is not surprising, therefore, that he curiosity of man has, for some time, led him into studies of the combustion that takes place within engines. To study this combustion, enclosed in the iron walls of the engine, a transparent material must be placed in the engine wall. The "window" in the cylinder wall may vary in size according to the experiment in which it is to be used. Photographic and spectrographic studies of gasoline combustion have been successfully undertaken for a number of years using these windows in the cylinder wall of an engine.

In ordinary gasoline engines, the flame is the result of the slow burning of a uniform mixture which is relatively free from carbon particles or soot. The Diesel engine, on the other hand, has a very rapid combustion of the fuel with a subsequent heavy soot formation. This soot condenses or settles on the interior walls of the combustion chamber; hence, any window placed so that its inner surface is flush with the inner wall of the combustion chamber will have a thick layer of soot deposited on it. A satisfactory window for studying Diesel combustion must of course remain clear during the operation of the engine or, if soot is deposited, the window must be self-cleaning. Such a window has been developed at the Armour Research Foundation. This window remains very clean under most operating conditions, and under other conditions only a slight film of soot is present. The cleanness of the window is very important since, for some experiments, exposures of four hours are required.

Experimenters often comment on the dirty windows, and some people even measure the amount of soot deposited for one operating condition as a function of time. When the deposit absorbs too much of the radiation, it must be removed for cleaning. This cleaning procedure has been tolerated by experimenters previously to the present window design.

The window itself is of fused quartz and the design of the window is such that a movement of air is constantly maintained in front of the window, preventing the soot from settling on it. Since quartz is heat-resistant, and has a low co-efficient of expansion and high tensile strength, it is suitable for the window proper. It proves an ideal material for the observation of the explosions in the engine chamber. It is transparent to the visible and the ultra violet radiation, and the transpareney extends somewhat into the infra red regions of the spectrum. Quartz windows are mounted in a removable plug in preferenee to mounting them directly in the engine wall. By this means, the plug can be removed for renewing windows.

Small fused quartz windows have been held in steel retainers by soft copper gaskets. The copper gasket is softened by heating it to a cherry red color in a flame and then quenching in cold water. Once the window has been assembled, it usually produces no trouble from eracking. Large windows are often held in place by copper-asbestos gaskets. Cementing fused quartz into a plug is also a standard practice for this purpose. Since invar and fused quartz have the same thermal co-efficient, they both expand equally within the temperature range of 20-350° C. The fused quartz may be cemented directly into invar without danger of cracking of the window as the engine warms and cools. Porcelain cement has been found excellent in binding the quartz and invar together, and in certain cases may be made more plastic by dilution with asbestos fibers.

The structure of the window and window mounting is shown in the diagram. Provision for side passing the main air blast on compression is made in the small air chamber A in which the carbon infected air is compressed, producing in turn a movement of the air at B which blows the soot away from window C. The side wall D may be made thin and long or thick and short depending upon the window temperature desired. The cleanness of the window seems to be a function of the magnitude of the air movement as it enters the window mount and the temperature of the fused quartz. The light transmitted by the window is collimated by the small fused quartz lens L.

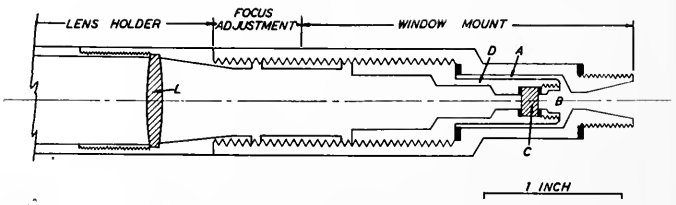
The diameter of the clear window shown in the figure is one-eighth of an inch and is suitable for certain experiments. The window mount screws into a three-eighths-inch hole in the engine cylinder wall. A larger size, one-fourth inch in diameter, has been found to work equally well and this window mount screws into a five-eighths-inch hole. Larger sizes have not been attempted but they are entirely possible.

This type of window has been in operation in a direct-injection-type Diesel engine for days with no sign of soot settling on the window. In the main chamber of the precombustion-chamber-type Diesel engine, no soot appeared on the window. The same window, when used in the precombustion chamber, did form a film which stayed on the window during operation. The thickness of the film changed with the operating conditions of the engine.

It is of interest to note that it is possible by focusing the image of the window on a screen to observe the deposition and removal of such soot particles as may remain on the window long enough to be detected by the eye.

With this window technique, studies have been made of the combustion using a drum camera and spectrograph. The drum camera is connected directly to the crank shaft of the engine. The photographic film is wrapped around the drum camera, and in this way the complete combustion cycle of the engine is recorded on the film. Information is thus obtained for all angular positions of the crankshaft in terms of the wavelengths emitted by the flame. Photographs of the flame have also been made using a continuously moving film in an Edgerton Camera. Successive flame photographs are thus obtained in order that the intensity and duration of the flame may be estimated.

ERNEST W. LANDEN.



WINDOW CONSTRUCTION IN WHICH SOOT COLLECTION ON WINDOW CAN BE CONTROLLED

HELP!

HELP!

HELP!

For three years I have written in this column about the scarcity of engineers for industry and the armed services; I have talked about the subject in speeches, on trains, and on the street. No doubt, my readers and listeners are coming to believe that I have become afflicted with a sort of disease that periodically breaks out as a rash. If it is a rash it has now broken out all over my body and I hope it catches others and becomes an epidemic.

Statements involving statistics usually are shunned by the average reader, but engineers must work with data to enable a dream or a creation to become a reality or to arrive at a justifiable conclusion. The statement that figures do not lie is common. But it has also been heard that the interpreters of statistics come to false conclusions or deliberately lie. It is hoped the following will bear close scrutiny and the conclusion be judged as reasonably correct. Then it is hoped somebody will do something about it.

It has been estimated that there are from 225,000 to 300,000 engineers in the United States who have graduated from a four-year accredited college course, including the masters and doctors. But just what branches of engineering this includes the writer has never seen broken down into the various professions. (There are mechanical, civil, electrical, chemical, fire protection, architectural, agricultural, sanitary, radio, communication, transportation, safety, mining, metallurgical, fuel, gas, marine, industrial, automobile and naval engineers. There are many others not mentioned here.)

Nor has an upper age limit been given. It has not been stated how many of these engineers are in life insurance, in fire insurance, in the ministry, politics, patent law, in teaching, in businesses, real estate, and in various pursuits foreign to engineering. There are many engineers too old to work or too crippled to be of any use and, of course, some die every day.

In the spring of 1941, a Carnegie Foundation report estimated that for that year there would probably be 12,200 engineers contemplating graduation in the United States and Canada and that 60,000 engineers would be needed that year. It was estimated that 13,000 engineers would take degrees in 1942. Just how many did graduate was not ascertained by me, but there were nowhere enough engineers to do the jobs outlined for production of "critical materials."

For the year 1943, it is contemplated that 13,500 will take engineering degrees. From past experience, it is estimated by various personnel directors that 60 per cent of the 1943 class will go into the armed services, thus leaving 5,400 engineers of the 1943 class for industry.

To aid the Selective Service System, it was necessary for me to inform hundreds of draft boards throughout the country regarding the urgent need for engineering personnel as teachers, candidates in the armed services for officers' training schools, as trainees in industry, governmental bureaus, research laboratories, etc. I conducted a survey and sent 160 letters last October to various defense industries asking them to inform me of their minimum requirement of four-year graduate engineers who would be needed to produce the necessary scheduled production then on the books for 1943. Several of the larger firms employing engineers were deliberately picked, and then the remainder were picked at random. One hundred forty-seven firms were heard from. They said that they must have over 12,000 of this year's (1943) class of graduating engineers. Now there are many other thousands of industrial concerns who must have engineers. There are but 5400 available because the others who are graduating will enter the armed services.

The armed services still need many thousands of engineers of all professions. Thousands of the older men from 30 to 55 years of age have taken and are taking officers' commissions. Civil service, as a feeder to many governmental branches, needs thousands of engineers and claims it must have them. Industry must have many thousands. Where are they coming from?

All of the first-semester freshmen, eighteen years of age and over in the United States, are rapidly receiving induction notices and many already have gone in the service. Over 95 per cent of the freshman engineers are eighteen years of age or over. The Selective Service System regulations provide that no engineering student, unless he has completed one academic year of engineering, is in good standing, and shows promise of graduating from an accredited college, may be considered for deferment. So the source of engineers for industry is drying up.

There is a plan, according to the papers, that purports to send back to engineering colleges students over 18 years of age after their basic training is completed next June or July. These students will be given an examination and standard intelligence tests. Those passing will be sent back for further intensive training in the colleges. But nowhere is it stated that these students will be trained for industry.

An advance release to Friday morning papers, dated December 18, 1942, released from the Office of War Information, shows that the War Manpower Commission is aware of the situation and is studying it. This release states: "A continuing reserve of technically trained men is all important in the nation's manpower needs. The entire program, the chairman said, will be fulfilled most effectively if students continue their education. Further, the commission is planning ahead so that there may be adequate reserves of college-trained manpower in essential occupations."

Because many engineers, out of school several years, cannot stand the social pressure of the jeers and the word "slacker" and the sight of so many of their friends in the service, they are jumping in as privates and into officers' training camps. The turnover of engineering personnel in many defense industries is from 30 to 40 percent. Also, the Selective Service System is taking many because "hard boiled" local draft boards will not be moved by the cry that the engineer is a "necessary man" in a "critical occupation."

The engineer is important in this emergency because he is indispensable in the creation, designing, research, testing, and production of "critical materials" for Group No. 1, the armed services, and in production of necessary materials for the families of the

men in the services. He is needed for the production to sustain Group No. 2, the defense workers and their families, and also Group No. 3, those who must sustain, by their production, Group No. 2 and Group No. 1. Further, if Karl T. Compton's figures are correct, and the chances of an engineer becoming president of an industry are 127 to one as compared with the chances of a graduate of a college of literature and art then many engineers are also "necessary" to act as officers, supervisors and managers of "necessary" industries.

Considering the urgent need of engineers, and their scarcity (because there are so few trained as engineers for the many necessary jobs to be done for the armed services, industry, and for the general public in sewage disposal, manufacture of clothing, food supplies, etc.), why, then, allow the first-semester freshmen to scatter throughout the armed services for basic training?

Consider further that most of the seniors in engineering colleges graduated in February, 1943, and also the sophomores and juniors remaining, are being taken by the Selective Service System and the call of enlisted officers' training schools. (The directives from the Selective Service System do not say engineering students in good standing *must* or *should* be deferred but state they *may be considered* for deferment.)

In spite of all this, it appears that the armed services are going to take care of themselves. But what are communities and states that depend on engineers for their lighting systems, sanitation, sewage disposal, and food supplies going to do for trainees and trained engineers? What is industry going to do to produce the essentials not only for our armed forces, necessary in increased quantities, but those also for our allies?

The War Manpower Commission has the result of our survey. This survey and other data have been sent by us industrialists in California, in Washington, D. C. and in New York. All of us have been pounding away to acquaint the McNutt Commission with the engineering picture. But someone must act quickly or 40,000 engineering freshmen in the United States will scatter out through the armed services. This will affect the remaining sophomores and juniors in the colleges because they will be stampeded into the armed services. All of this will tend to inhibit the steady flow of qualified graduate engineers that the armed services, industry, civil service, research laboratories, and the general public urgently need.

JOHN J. SCHOMMER.

S P E E

Faced with the problem of meeting one of the nation's most critical manpower shortages—engineers, an organization conceived in Chicago at the World's Columbian Exposition in 1893 will return to Chicago in June for its golden anniversary convention.

It is the Society for the Promotion of Engineering Education. It will observe its fiftieth birthday at a convention to be held on Friday, Saturday and Sunday, June 18, 19, and 20, 1943, at the Drake Hotel in Chicago.

The Society's 138 institutional members are the colleges, universities and technical schools which graduate approximately 15,000 engineers each year, and its nearly three and a half thousand individual members are the engineering educators who train these embryo engineers.

For fifty years, these members have concentrated their efforts into building engineering education to its present position.

But now, in a nation at war, 15,000 engineers a year are not enough; the most conservative estimates indicate that at least 80,000 engineers are needed. Some estimates even run as high as 200,000.

For this reason, the golden anniversary convention will be "streamlined," and its program will be devoted exclusively to discussions and topics relative to the place of colleges and engineering education in the war.

Illinois Institute of Technology and Northwestern Technological Institute will serve jointly as hosts of this important war-time meeting. All arrangements for the convention will be made by joint committees or special committees from the faculty of the two schools.

Not only is Illinois Tech one of the hosts to the convention, but its president, Dr. Henry T. Heald, is serving as president of the Society during this crucial year. Dr. Heald is the youngest president in the history of S. P. E. E.

Prof. Robert C. Kintner of Illinois Tech and Prof. C. E. Watson of Northwestern will serve as co-chairmen in charge of all local arrangements for the conclave. They will be assisted by several committees.

In addition to selecting convention headquarters, the Drake Hotel, Profs. Kintner and Watson have set up an outline for the convention program, appointed committees to handle the various details, and are well along in their arrangements.

The program outline is as follows:

Friday, June 18:
Morning—Registration.
12 M.—Council luncheon.
2-5 P. M.—General session.
5 P. M.—Meeting of nominating committee.
7 P.M.—Council dinner.
Conference dinners and programs.

Saturday, June 19:
7 A. M.—Council breakfast.
9 A. M.—12 M.—General session.
12:30 P. M.—Conference luncheons
2-5 P. M.—Conferences.
7 P. M.—Annual dinner.

Sunday, June 20:
7 A. M.—Council breakfast.
9 A. M.—Anniversary chapel service.
10:30 A. M.-12:15 P. M.—Division conferences.
2-4 P. M.—Final general session.

Other Illinois Tech faculty members who have been named chairmen of committees to assist Profs. Kintner and Watson in arrangements include: Prof. J. B. Finnegan, registration; Prof. Charles O. Harris, conference rooms; Prof. Walter Hendricks, fiftieth anniversary memorial activities; Raymond J. Spaeth, finance; and Paul O. Ridings, publicity and printing.

The complete and detailed program for the meeting will be announced later.

P. O. R.

THE ENGINEERING COLLEGES
ARE IN THE
TOTAL WAR

NEW TRUSTEES

Executives of three Chicago companies have been appointed to Illinois Institute of Technology's Board of Trustees. The appointments were made at two recent meetings of the board.

The new members of the board, which now totals fifty-eight, are: E. CHANNING COOLIDGE, president of Crowe Name Plate & Manufacturing Company; GEORGE A. EASTWOOD, president of Armour & Company; and DAVID LEVINGER, vice-president of Western Electric Company.

Mr. Coolidge is a native of Kentucky, having spent the first twenty years of his life there and received his early education in the Kentucky schools. He attended the Ohio Military Institute in Cincinnati, O., for two years and then began his business career by assisting his father, in charge of what is now known as the Southern Railways System.

Mr. Coolidge came to Chicago in 1897 and after working with his uncle for a time joined his present company as a sales representative. He gradually rose to the position of vice-president and treasurer, and in 1928 he became president, retaining the offices of vice-president and treasurer as well.

Mr. Coolidge, who has always been interested in the life and works of Abraham Lincoln, has done much for the Negroes of the bluegrass region in Kentucky. He is an active member of the Board of Trustees of the Lincoln Memorial University, Harrowgate, Tenn.

Mr. Eastwood has been president of Armour & Company since 1939; he has been affiliated with the company since 1897 beginning as a stenographer and rising to the presidency.

His business affiliations include directorship in Armour & Company, the Institute of Meat Packers, the Illinois Manufacturers Association and the Crane Company. He is also a member of the National Association of Manufacturers and the American Soap and Glycerine Products organization.

Mr. Eastwood's club memberships include the Economic Club, Newcomen Society of England, Commercial Club, and the Bankers Club of America. He is also a director of the Chamber of Commerce of the United States.

Mr. Levinger, as well as being vice-president of Western Electric, is general manager of the Hawthorne Works in Cicero. He began his career at twenty when he entered the laboratories of the Deering works of the International Harvester Company. Three years later he joined the Western Electric Company and as a mechanical engineer was assigned to the study of manufacturing methods.

He rose to various posts in the company's technical organizations, becoming vice-president in 1942.

Mr. Levinger is active in the affairs of the American Institute of Mining and Metallurgical Engineers. He is also a member of the American Institute of Electrical Engineers, American Society for Metals, American Association for the Advancement of Science, and the American Society of Mechanical Engineers.

P.O.R.

THE BOOK SHELF

JAMES THURBER'S TRAPPED WORLD

Readers of the *New Yorker* (and who isn't?) will welcome the Thurber sketches collected in *My World—And Welcome To It.* Thurber may have thought that he was being ironical in offering such a world to the public, but the irony is a boomerang since thousands are happy to accept a world as patterned by Thurber. It might be said that "Thurber does more than Milton can to justify God's ways to man."

Those who dislike Thurber's writing ("Breathes there a man with soul so dead?") have hurled charges of "decadence" and "frustrated" against him hoping that the charges would stick. It is true that Thurber is no meliorist, and it is also true that his style is delicate, his material limited. But what he attempts to do he does with perfect art. His drawings of puzzled dogs sniffing the flowers (these dogs are pre-Ferdinand, by the way) or baying at the moon, Walter Mitty overwhelmed by his wife, or Kinstrey overwhelmed by a whip-poor-will *are* portraits of frustration. When one poses the first two questions of criticism: (1) What is the author attempting to do, and (2) How has he done it, defenders of Thurber can give him the best marks.

The book is, as I have indicated, a gathering. So pervasive is Thurber's attitude towards the world, however, that there is a kind of unity to the collection. His attitude is a curious mixture of the traditions of three such giants as Jonathan Swift, Laurence Sterne, and Lewis Carroll. Such a passage as the following might have come from the last book of *Gulliver's Travels:*

> "If we are going to indulge in adjectives beginning with 'm'," said the lemming, sharply, "let me apply a few to your species—murderous, maladjusted, maleficent, malicious, and muffle-headed."
>
> "You find our behavior as difficult to understand as we do yours?"
>
> "You, as you would say it," said the lemming, "you kill, you mangle, you torture, you imprison, you starve each other. You cover the nurturing earth with cement, you cut down elm trees to put up institutions for people driven insane by the cutting down of elm trees, you—"
>
> "You could go on all night like that," said the scientist, "listing our sins and our shames."

Where Swift had a savage indignation at man's abuse of reason, where Swift concealed his sense of pity underneath a scathing irony, Thurber reveals his and mingles it with a modern bewilderment and frustration. Although Thurber's irony is more delicate and fragile—close to whimsical at times, although he would murder one for saying it—it can nevertheless bite. Thurber, like Swift, has dwelt wonderingly on man's basic animalism, and like the greater satirist, Thurber apologizes to the animals for the comparison: "If

(Turn to page 44)

FROM YEAR TO YEAR

A RECORD OF OUR ALUMNI AROUND THE WORLD

BUSBEY

Fred Ernst Busbey

MEN OF THE MONTH

The ENGINEER presents in this issue as its nomination for one of the men of the month, Congressman Fred Ernst Busbey, a civil engineering student in the class of 1922.

In the November, 1942, election, Busbey was elected from the Third Congressional District as representative in Congress on the Republican ticket. This was his first campaign for public office and it was eminently successful. He continues to operate his brokerage business at 10 South La Salle Street, Chicago, by remote control from his present location in Washington. He is president and treasurer of Fred E. Busbey & Company, an investment securities firm. This business was started by Mr. Busbey in 1931 and has been operated successfully since that time.

"The Fighting Redhead" was born at Tuscola, Illinois, on February 8, 1895, and came to Chicago in 1909. He attended the Madison Avenue Public School and, later, Hyde Park High School, where he won an Armour Institute scholarship. He entered the Institute as a student in the Department of Civil Engineering.

On September 26, 1917, he enlisted in the regular army. After thirty days at Jefferson Barracks, Missouri, he was transferred to the 31st Division at Houston, Texas. His assignment was to the 124th Field Artillery, which served overseas, and with this regiment he participated in the St. Mihiel and Meuse-Argonne campaigns.

Upon the recommendation of General Pershing and two other generals, he was placed in nomination for officers' candidate school, but this appointment was declined by Busbey for the reason that he did not wish to be separated from his companions of the 124th with whom he had served through the entire war. He was, however, commissioned a first lieutenant in the reserves in 1922. This commission he held until 1932 when, because of the pressure of business, he had to forego further activity in this line.

It is interesting to note that throughout his entire career, Busbey was forced to earn his own way. Prior to entering high school, he was employed in the engineering department of the Grand Trunk Railway; later, he was employed by the Chicago Rapid Transit Company as a guard, in charge of collecting the day's receipts from stations of the South Side division. In addition to this work, while at Armour he was steward of the Phi Kappa Sigma house, and made an enviable reputation in handling the affairs of his fraternity.

Upon his return to Chicago, shortly after the World War, he reentered the Institute and was married to Miss Julia Humpf, to whom he had become engaged before enlisting in the army. Finding that he could not keep up his work at the Institute, maintain a home and successfully carry on several jobs, Busbey left the Institute finally in

YAP

C. W. Beers Studio

June, 1920, when he became a sales engineer for West & Dennett, a manufacturers' agency operating in Chicago. He continued in this field until February, 1921, when upon hearing of the possibilities in the investment brokerage field at a public speaking class he was attending, he decided to investigate this business. The result of this action was employment with various brokerage houses, until February, 1931, when he formed his own company.

Busbey, not having any political aspirations, was forced to enter the Congressional race in the 3rd District by the voters in this district. He campaigned without endorsement by any of the regularly established political groups, and carried through a fearless and spirited campaign on the basis of his representation of the people and his voting in Congress according to their wishes. His principal credo is Americanism, and his campaign was marked by many references to the necessity for unified effort in winning this war.

He is a member of the Beverly Hill Post 407 of the American Legion; 33rd Division War Veterans Association; Local Draft Board 32; Ridge Country Club; Tracy Lodge 810, A. F. & A. M.; and Phi Kappa Sigma Fraternity.

According to his own statement, Busbey's main hobbies are work and more work. His approach to any problem is an intensive application, until a proper solution is found. Although he is a member of the Ridge Country Club, he admits frankly that he has had very little time to enjoy the privileges it affords. His main interest is in his family which includes Mrs. Busbey and a son, Charles, who has passed his thirteenth birthday. The Busbey home is at 9144 South Hoyne Avenue, Chicago.

A. H. JENS

Diosdado M. Yap

One of the graduates of Lewis Institute in the Class of 1930 was a young man of interesting antecedents who has since had notable success in this country and in his native Philippines.

Diosdado M. Yap was born December 5, 1907, in the town of Baybay, Leyte, Philippine Islands. For some time he attended the convent school in his home town, under the direction of the parish priest, a native Filipino who felt that his first duty was to inculcate rigid discipline, respect for parents, and reverence for God. Later, Diosdado Yap attended public grade and high schools, and began his studies of the English language and his preparation for college work in the United States.

The Yap family was of the managerial or land-owning class, and the young man had many opportunities to gain insight into the lives of the tenant farmers on the family property. He learned to swim and to dive. Frequently he went on trading trips from town to town, on sail boat or motor boat, selling rice, corn, fish, water buffaloes, goats, pigs, and chickens. Included in his youthful activities was experience in the drygoods and hardware stores owned by his family.

In the public schools he was president of his class in the grades and also president of the whole student body; he was successively president of the freshman, sophomore, and junior classes in high school, and won a special scholarship awarded by the municipal government.

Mr. Yap came to the United States in 1926, for the beginning of his collegiate education, during which he earned six degrees. He attended Crane Junior College, where he received the A.A. degree; at Crane he was associate editor of the school paper, member of the debating team, and member of the honorary fraternity Phi Rho Pi. During the summer he attended the law school of Northwestern University and served as president of the school's Cosmopolitan Club. As a student at Lewis, where he received his B.S. degree in 1930, he won the Lewis scholarship debate.

After graduation from Lewis, Mr. Yap was employed as a clerk in the United States Bureau of the Census and studied at George Washington University, where he received the M.A. degree in Education; in 1932 he was awarded an M.S degree by the National University. He also holds the degrees of LL.B., Ed.D., Ph.D.

Today Dr. Yap, widely known as a scholar, economist, lecturer, and publicist, is contributing his best efforts to the Victory program. He has made repeated trips to the Far East, having visited in recent years Japan, China, and his native islands. He is a recognized authority on Oriental affairs.

Since Pearl Harbor, he has lectured to officers and enlisted men in more than fifty Army camps throughout nine Service Commands and at Panama; his hearers have been nearly a million. He has served as consultant to the Coordinator of Information of the War Production Board. During the Seventy-Seventh Congress, three members of the House quoted from his writings and speeches.

This busy alumnus of the Institute now Far East commentator for Radio Station WINX in Washington; special correspondent, editorial and feature writer, and commentator on world affairs for the Filipino Reporter, a monthly publication dedicated to the cause of American-Filipino good will and mutual understanding; and technical advisor to the Filipino Federation of America. The spirit of this latter organization is shown by its pledge: "With all my mind, my heart, and my soul, before God and before the world, I pledge my loyalty to the United States of America."

During his career, Dr. Yap has been Publicity Director and Research Assistant for the Philippine Resident Commissioner to the United States; Director of the Philippine Information Bureau; Managing Editor of the Philippine Journal; member of the technical staff of the Joint Preparatory Committee on Philippine Affairs; and technical advisor of the Philippine World Federation, Inc., of Honolulu.

Much of Dr. Yap's time is now spent in lecturing before audiences throughout the United States. Some of his recent subjects have been *Japan's "New Order"; American Policy in the Pacific; The Far East at War; Strategy of War in the Far East;* and *The Fate of the Philippines.*

Dr. Yap is listed in *Who's Who in the Professions; Who's Who in the Philippines; Who's Who in the East;* and *Who's Who in the Nation's Capital.* He is the author of *History of Higher Education in the Philippines,* and of many articles on the Far East which have appeared in American periodicals. He has won gold medals for oratory in the United States and in the Philippines, and has been called one of the ten greatest living Filipino orators. He is a member (and past president) of the Visayan Circle, Inc.; life member of the National Education Association; member of the National Academy of World Economics; member of the fourth degree of the Knights of Columbus.

In May, 1935, Dr. Yap married Margaret Mitchell. They have one son, Diosdado, Jr., who was born March 9, 1936, in Pennsylvania, his mother's native state.

HOWARD A. CARTER

ILLINOIS TECH ALUMNI ASSOCIATION

The first Officers and Board of Directors of the Alumni Association of Illinois Institute of Technology were elected on the evening of December 9, 1942, at the Association's Annual

General Meeting held in the grand ballroom of the Hotel La Salle in Chicago.

The more than a thousand alumni who attended the meeting elected George H. Von Gehr, E.E. A'28, President; Sidney B. Westby, E.E. L'33, Vice-President; Mrs. A. T. Reynolds, A.S. I'41, Secretary-Treasurer; Leonard P. Zick, Jr. C. E. I'42, Representative on Board of Directors from Graduate School; Claude A. Knuepfer, C.E. A'15, Representative on Board of Directors from College of Engineering; Jules L. Brady, A.S. L'28, Representative on Board of Directors from College of Arts and Sciences; J. Warren McCaffrey, Ch.E. A'22, Alumni Representative on Board of Trustees; and A. H. Fensholt, M.E. L'13, Alumni Representative on Board of Trustees.

Preceeding the election Mr. A. H. Fensholt, General Chairman of the First Annual Illinois Tech Alumni Fund, presented to President Henry T. Heald the Alumni Fund and its Founders Roll.

Following the election a very inspiring address was given by Colonel Carlos P. Romulo, who is aide-de-camp to General Douglas MacArthur and who was the last man to leave Bataan.

ARMOUR ALUMNI ASSOCIATION

Regular meetings have been held by the Board of Managers of the Armour Alumni Association, and various problems concerning the Association have been discussed. These problems included a complete review of the Alumni Student Loan Fund policy, with a view to possibly simplifying the handling of these accounts. By the unanimous vote of the Board, a portion of the alumni funds was placed in government bonds for investment purposes.

Working committees were appointed by President C. A. Knuepfer to serve during the ensuing year. These committees are as follows:

Alumni Meetings
E. Voita, Chairman
A. P. Schreiber

Alumni Relations
L. J. Byrne, Chairman
J. W. McCaffrey
S. M. Lind

Awards
W. F. Sims, Chairman
J. J. Schommer
E. F. Pohlmann

Publications
J. Hommes

Student Loan
A. H. Jens, Chairman
G. H. Von Gehr
C. A. Knuepfer, Ex officio

Trust Fund Committee
E. F. Pohlmann, Chairman
J. W. McCaffrey
J. J. Schommer

The Board of Managers voted to support the recent organizational meeting of the Illinois Tech Alumni Association, and a small contribution to assist in defraying the expenses of this meeting was approved.

No decision has been reached as to whether the Spring Meeting is to be held this year, in view of war conditions. The advisability of holding a general alumni gathering is being studied by the Committee on Alumni Meetings under the direction of Eugene Voita.

1897

Florsheim, Leonard S., Ac. A., now resides at 209 Lake Shore Drive, Chicago, Illinois.

1899

Huey, Ray S., E.E. A. His retirement as superintendent of the Universal Atlas Cement Company plant in Duluth, Minnesota, was announced by the firm on December 17, 1942. He had held the position since 1916.

A man whose varied hobbies have brought him before almost every civic organization and church in Duluth, Mr. Huey finds retirement at 66 "not so hard to take." Mr. Huey and his wife reside at 1822 East Third Street, Duluth, Minnesota.

1900

The following letter was sent to the Alumni Office by the publicity office of Westinghouse, East Pittsburgh, Pa.

Dear Sir:

The Westinghouse award of merit, the silver "W," with inscription, "Whom his fellow men delight to honor," has been awarded to Dean Harvey, E.E. A'00.

After a four-year period of engineering with Underwriters' Laboratories, Harvey in 1904 entered the Westinghouse firm at East Pittsburgh, taking up insulating and switchboard engineering; in 1911 he started materials work, in which field he has since continued, with his latest award attesting the value placed on his work by the company.

A former vice presidency in ASTM substantiates Mr. Harvey's eminence in testing and specifications on materials, and fits in with membership and activity in AIEE and ASST.

Home address of the Harveys is 109 Dewey Avenue, Edgewood, Pennsylvania.

1902

Aylward, Emma B., Ac. L., is now living in Manly, Iowa.

Briggs, Marion W., E.E. A., now resides at 3941 Torrence Street, Toledo, Ohio.

1906

To Armour Alumni Association, Class of 1906: The family of Mr. Frank J. Flanagan gratefully acknowledges your kind expression of sympathy.

The above was taken from a card which we received and which we forwarded to the Secretary-treasurer of the Armour Alumni Association.

1907

Grant, Helen S., A.A. L., who formerly taught at the Washburne High School in Chicago, is now living at the Leamington Hotel, Minneapolis, Minnesota.

Kirkland, Curtis R., Ac. L. New mailing address is Box 684, Arcadia, California.

1908

Healey, Claude S., Ac. L., lives at 806 Oakley Avenue, Elgin, Illinois.

1909

Fischer, Ferdinand A., A e, is an Instructor in the department of engineering at Wright Junior College. He and Mr. James A. Clear are the authors of a new book, *Descriptive Geometry*, for engineering and architectural draftsmen. Mr. Fischer resides at 848 Park Avenue, Wilmette, Illinois.

1910

Moulton, H. Harper, Ac. L., is a field director of the American Red Cross, 720 South Michigan Avenue, Chicago, Illinois. His residence address is 925 Cherry Street, Wheaton, Illinois.

1911

Downtown, Mrs. P. G., D.E. L., resides at 921 Lake Street, Oak Park, Illinois.

James, Garrett B., Ch.E. A., writes that on February 1st he is severing his connection with Western Factory Insurance Association, Chicago, Illinois, with whom he has been employed as chemical engineer in the engineering department since 1935. His new position will be fire insurance and fire protection engineer for Monsanto Chemical Company, with headquarters in the general engineering department at 1700 South Second Street, St. Louis, Missouri. Mr. James requested that his mailing address be changed to 526 Baker Avenue, Webster Groves, Missouri.

1912

Gardner, Franc J., Ac. L., has recently changed his residence address to 1400 Lake Shore Drive, Chicago.

Horwitz, Charles K., Ac. L., (formerly Levin), wrote to Dean Clarke as follows:

Dear Sir:

I met an old classmate from Lewis Institute the other day, and he felt that I owed the school some accounting of my work. I must confess that I have been wholly out of touch with it, even though I spent some happy years there.

Through the interest of George Noble Carman, I was aided on my way to Harvard, graduating from Harvard College in 1915 and from the Harvard Law School in 1919. I also hold a master's degree in public administration from New York University.

I was associated with the National Industrial Conference Board for several years and left them to become vice-president of a wholesale mercantile firm. In 1934, I became an administrator with the Department of Welfare in New York and am on leave since last September—serving as captain in the Army with the Office of Special Service, Second Corps Area, Headquarters, New York.

I trust you may find this data of interest, and will be happy to be kept informed about the present day Lewis Institute.

Sincerely yours,
(Signed) Charles K. Horwitz.

1913

Kellogg, Lois S., D.E. L., has recently changed her residence address to Parkside Hotel, 18 Gramercy Park South, New York. Miss Kellogg is employed by the Hecker Products, Incorporated, Flour and Cereal Division, 88 Lexington Avenue, New York.

1914

Sexsmith, Harold O., A. A., has been transferred from the Benicia Arsenal, Benicia, California, to the duty of post engineer, March Field, Riverside, California, and promoted to the rank of major.

Dugan, Hugh G. Ac. L., now resides at 728 South Washington Street, Hinsdale, Illinois.

1915

Harman, Eugene S., M.E. A., is operating vice-president with the Loftus Engineering Company, 1620 Oliver Building, Pittsburgh, Pennsylvania.

1917

Coleman, George W., Ac. L., has recently moved to 6477 Oxford Avenue, Chicago.

Hilgebrand, Elmer W., M.E. L., who is acting general commercial engineer for the Indiana Bell Telephone Company, 240 North Meridian Street, Indianapolis, Indiana, has recently changed his residence address to the Michigan Hotel, Indianapolis, Indiana.

1918

Sweet, John R., Jr., A.S. L., who recently lived in St. Louis, Missouri, is now employed by the War Production Board at 20 North Wacker Drive, Room 2501, Chicago. His new residence address is 611 Elmwood Avenue, Wilmette, Illinois.

1919

Brown, Mrs. Cyrus F., Ac. L., owns a very picturesque restaurant in old Albuquerque, New Mexico, according to a recent note which reads as follows:

We have a restaurant seating 150, located in the Casa de Armijo, built in 1706 in Old Albuquerque. It faces the plaza and is adjacent to the old mission of San Felipe de Neri built at the same time by a band of settlers given grants of land by the King of Spain. All our walls are of adobe, and are three feet thick, built aroond charming patios.

The La Placita restaurant has a curio shop in connection with it.

SULLIVAN, ANDREW P., E.E. A., is a lieutenant-colonel in the United States Army. His mailing address is 432nd C.A. Bn. (A.A.), APO 887, New York.

1921

DIETRICH, PAUL O., Ac. L., is living at 4030 Milwaukee Avenue, Chicago, Illinois.

1922

LITTLEJOHN, ELLEN V., A.A. L., according to a news release from the Naval Reserve Midshipmen's School (WR), Northampton, Massachusetts, is a lieutenaot (j.g.) in the United States Naval Reserve.

1923

MAYO, ROBERT S., C.E. A., recently wrote as follows:

Dear Sir:

Captain Robert S. Mayo, C.E. A., '23, and Captain Frederick Sloan, A. A., '23 meet, after twenty years, at Camp LeJeune, New River, North Carolina, where both are serving again in the United States Marine Corps.

. . . . . .

Captain Mayo's mailing address is now Div. P. & P.—General Headquarters, Washington, D. C. Captain Sloan, who served in World War I with the famous Sixth Marines, was wounded in action in 1918.

Mayo (left) and Sloan

1924

HALLMAN, EDWARD C., A. A., is a private in the United States Army and is stationed at South Post, Fort Myer, Virginia.

1925

BALDWIN, WILLIAM H., F.P.E. A., has recently moved from 4152 Beard Avenue, South, Minneapolis, Minnesota, to 4226 New York Avenue. Des Moines, Iowa. Mr. Baldwin is state agent for New York Underwriters Insurance Company, 90 John Street, New York and is located in Room 208, Securities Building, 418 West Seventh Street, Des Moines, Iowa.

1926

STEFFEN, EDWIN F., M.E. L., has been transferred from the 37th Armored Regiment to the Tank Destroyer BUTC, and claims that one of these days it will be one of the strongest fighting units in the United States Army. He is a captain.

WILSON, FRANCIS E., E.E. A., who formerly worked for the Illinois Bell Telephone Company, Chicago, is now a lieutenant in the United States Naval Reserve. He may be reached at the U. S. Naval Air Station, Upham, Canal Zone.

1927

BRYAN, DR. FRED M., JR., A.A. L., has been in the United States Army since August 25, 1942. He is at present stationed at the 6th Mtz. Div.-63rd Inf. 3rd Bn., Hq. Co., APO 6.

BURKHARDT, KARL J., E.E. A., is a second lieutenant with the Signal Corps, Utah QM Depot, Ogden, Utah.

1928

NELLI, HUMBERT O., A.S. L., who is a first lieutenant in the United States Army, is now stationed at the Blue Grass Ordnance Depot, Richmond, Kentucky. He holds the position of post adjutant. His home address is 2051 Harrison Street, Chicago, Illinois.

1929

LEVEN, AARON S., A.S. L., wrote on January 7, as follows:

Mr. George Von Gebr, Pres.
Alumni Association Illinois Institute of Technology,
79 West Monroe Street,
Chicago, Illinois
Dear Friend:

Thank you very much for your letter of December 28th. I, too, wish to extend to you and yours a fervent hope that "Victory will bring to the peoples of the earth the peace for which we are fighting," and that you and yours and our family of alumni will have an abundance of health and happiness this year.

You might be interested to know that since last June I have been in the service of my country, and my duties have caused me to travel from coast to coast.

At the present time I am stationed at the Rossford Ordoance Depot, Toledo, Ohio, of which I am post surgeon.

As our newly elected president you no doubt will have your hands full this year. May God grant you health to carry on.

Sincerely,
(signed) A. LEVEN
Surgeon.

HROMADA, JOSEPH C., E.E. A., formerly Chief, Experimental Station, Civil Aeronautics Administration, Department of Commerce, Indianapolis, Indiana is now with the Technical Development Division, Department of Commerce, Washington, D. C. His new residence address is 8718 Cameron Street, Silver Springs, Maryland.

1930

GOETSCHEL, ROBERT L., C.E. A. His new business address is U. S. Engineers Office, Boca Raton, Florida.

JONES, GUY D., A.S. L., is a warrant officer in the United States Navy and is stationed at Alameda, California.

NELSON, CHARLES, JR., A.S. L., has been made chief engineer of the Ahlberg Bearing Company, in charge of bearing design aod development work. Mr. Nelson resides at 4052 Parker Avenue, Chicago, Illinois.

NEVILIER, BYRON L., A. A., formerly an art teacher at Stanford University and Menlo Junior College of Palo Alto, California, is now a lieutenant (j.g.) in the United States Naval Reserve. Lieutenant Nevilier's mailing address is Operations Officers — Headquarters Staff, Western Sea Frontier, Federal Building, Navy Department, San Francisco, California.

SHERMAN, FRED A., F.P.E. A., has been appointed special agent in Illinois for the National Fire Insurance Company of Hartford. Mr. Sherman will travel the northern Illinois territory and will have his headquarters at the Western department in Chicago under the supervision of State Agent E. E. Parker. Mr. Sherman resides at 1524 North Linder, Chicago, Illinois.

NEVILIER

1931

DAVIDSON, LEONARD D., E.E. A., now resides at 1249 Roscoe Street, Chicago, Illinois.

FIALA, OLIVER, Ch.E. A., has recently moved from Louisville, Kentucky to Boonton, New Jersey. He is now employed by E. F. Drew & Company, 416 Division Street, Boonton, New Jersey.

LINDQUIST, BERT S., C.E. A., has been promoted from lieutenant to lieutenant-commander in the United States Naval Reserve. His mailing address is C.E.C., U.S.N.R., Resident Officer-in-Charge, Naval Ammunition Depot, McAlester, Oklahoma.

1932

ERICKSON, CARL A., C.E. A., is a lieutenant in the United States Navy and may be reached at Waterview Apartments P-4, Portsmouth, Virginia. His business address is Public Works Office, Norfolk Navy Yard, Portsmouth, Virginia.

WILTRAKIS, EDWARD J., C.E. A., major with Corps of Engineers recently wrote the following letter to the Alumni Association.

Dear Sir:

Your New Year's greetings were forwarded to me out here and reminded me to write back what little change I've made since my last report back to the school as to my activities so that my record may be complete. I am still on permanent assignment with the staff and faculty, the Engineer School, Fort Belvoir, Virginia, but at present am attending the Third Services of Supply Staff Course at the Command and General Staff School, here at Fort Leavenworth. The course lasts nine weeks and I'll be on my way back to Fort Belvoir soon. Like all the staff courses here it is a tough course with plenty of studying reminding me of the nights I lost sleep back in the days when I was going to school at Armour.

Aoother change that happened since my coming here is a promotion to major, Corps of Engineers.

The family stayed behind in Arlington, Virginia, and I'll be going back there at the end of this month. So for your records you can still send the magazine and other school information to the following address: Major Edward J. Wiltrakis, C.E., 322 S. Veitch Street, Arlington, Virginia.

Wishing the school and the alumni association the greatest success, I remain,

Sincerely,
(signed) EDWARD J. WILTRAKIS.

1933

LUCKERMAN, PHILIP, Ch.E. A., lieutenant in the United States Army, recently changed his address to Co. C, 846th Engr. Avn. Bn., APO 3396, c/o Postmaster, New York City, New York.

SNELLING, ELROY A., E.E. A., entered the Navy in May, 1941 as a seaman 1st class and received rating as radioman 2nd class while teaching radio in a R.A.F. Radio School in Canada, under command of a U. S. naval detachment. He was commissioned as a lieutenant at the U. S. Naval Air Station, Corpus Christi, Texas last June. Lieutenant Snelling's residence address is 3009 Cornwall Drive, Corpus Christi, Texas.

1934

CALLEN, LOV A., C.E. A., wrote the following letter in answer to the letter sent to all alumni in the armed forces from John J. Schommer:

Dear John:

I received your letter of November 25 this date and was very glad to hear from you. . . . I want to tell you frankly that only eternity will reveal to you all the good you have done for I.I.T. and your fellowmen. John, you have always been helpful and encouraging to all of us, nothing ever being too difficult to undertake in our behalf, and last but not least you always have a hearty "hello" and a smile for everyone.

No doubt you are interested in knowing a little regarding another A.I.T. Grad. I left the Sanitary District of Chicago in November, 1941 to accept a position as sanitary and water supply Engineer, Ft. Riley, Kansas. I served the War Dept. there until Oct. 29, 1941 at which time I was commissioned as a 1st. Lt. Sanitary Corps, being sent to Camp Grant, Illinois, as my first station. From Camp Grant I was ordered to the Mississippi Ordnance Plant, Jackson, Mississippi on Dec. 12th, 1942. I am now serving as post medical inspector assigned to the 4th Service Command, Atlanta, Georgia. I like the work here very much. Will appreciate hearing from you again if you ever get time to write.

As always,

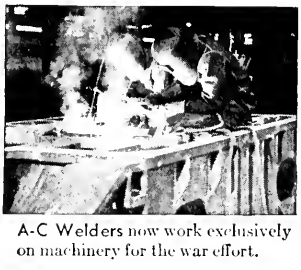
(signed) Lov A. CALLEN
1st Lt. Sn.C. A.U.S.
Post Medical Inspector

HUETTEN, CLARENCE, E.E. A., has recently moved from 3 Woodland Drive, Indianapolis, Indiana, to 867 North Linwood Avenue, Indianapolis, Indiana.

LARSON, JOHN A., who formerly worked for the Public Service Company of Northern Illinois in Joliet, Illinois, is now a lieutenant in the Signal Corps.

MYERS, GERALD E., F.P.E. A., passed the bar examination last December 8. He has been employed by the W. A. Alexander & Company, 135 South LaSalle Street, Chicago, in the engineering department. He was graduated from

Fatter Porkers...Faste



A-C Welders now work exclusively on machinery for the war effort.

ALLIS-CHALMERS FARM and milling equipment helps produce corn for U.S. porkers and steers . . . wheat for 8 of every 10 bread loaves produced in the U. S. A.

Allis-Chalmers *industrial* equipment (more than 1,600 different capital goods products) works in every war industry . . . helps produce planes, tanks, ships, guns at a rate which must make Hitler shiver!

And Allis-Chalmers engineers—cooperating with plant engineers in every part of the country—are helping manufacturers *produce more*—not just with new machines, *with machines now on hand!*

Every Allis-Chalmers man and wom is working *all out* for Victory. Our one j right now is winning this war. But from t war work we are gaining rich producti experience which will be invaluable to t Nation when the war is over. We'll ready to help build a better peace!

ALLIS-CHALMERS MFG. CO., MILWAUKEE, W

ALLIS-CH

OFFERS EVERY MANUFACTURER EQUIPMENT AND ENGINEERING

ELECTRICAL

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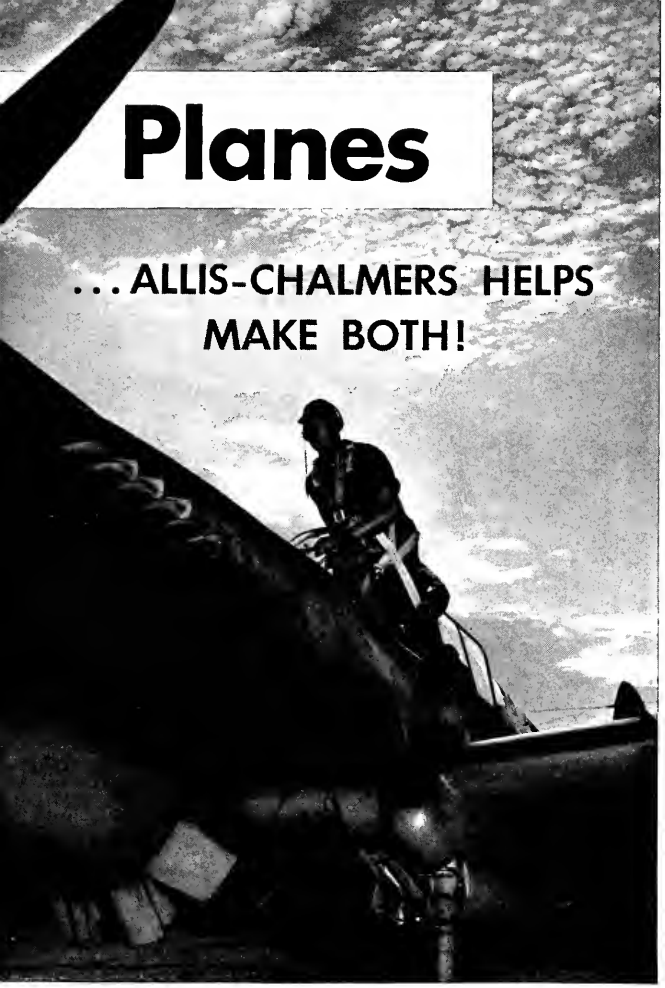

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tal goods products in the world.

Rubber boats, tires, balloons are made with the aid of Allis-Chalmers equipment.

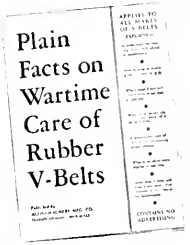
VICTORY NEWS

Inland Shipyards: Hundreds of A-C pumps, motors and V-belt drives are at work along the Great Lakes helping in the greatest shipbuilding activity this region has ever known.

Ore carriers, tankers, cargo vessels—even submarines—are being built here.

Tremendous expansion of facilities was required to meet the goals set—and equipment for the yards, as well as for the ships, has left A-C plants in great quantities.

YOU'LL WANT THIS HANDBOOK



FREE!
Contains No Advertising

New 16-Page Book applies to all makes of V-belts—tells how to conserve rubber through correct V-belt maintenance: how to measure proper tension; what determines "life expectancy"; what to do about worn sheaves; much other useful information. Liberally illustrated. Ideal for training new men. Write for your free copy.

New A-C War Plants: Two big new Allis-Chalmers war plants are now in operation "somewhere in the USA"...the second in a record 90 days after the ground was broken.

To save time and critical materials, wood construction was adopted for the newest plant. Practically the only metal used was in caps for the ends of trusses and columns. These were cast in A-C foundries to save time.

FOR VICTORY
Buy United States War Bonds

ALMERS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

TION TO HELP INCREASE PRODUCTION IN THESE FIELDS...


AND SAW


CHEMICAL PROCESS


CRUSHING, CEMENT &


BOILER FEED


POWER FARMING


INDUSTRIAL TRACTORS

the John Marshall Law School, Chicago, last June. He resides at 405 Mitchell Avenue, Elmhurst, Illinois.

STOREY, DONALD G., C.E. A., received his letter from John Schommer at Pearl Harbor. Where he is now no one knows, but his mailing address is Navy 8090, F.P.O., San Francisco, California.

1935

BANIC, JOHN M., E.E. L., writes that he is now a lieutenant in the United States Army Specialist Corps. He was former navigator-radio operator for the Pan American Air Ferries, Inc., at Miami, Florida.

FREEDMAN, ROBERT J., A.S. L., is a first lieutenant in the United States Army Medical Corps. His home address is 3303 Washington Boulevard, Chicago, Illinois. He was formerly a resident physician at the Cook County Hospital.

A recent newspaper article from *The Sentinel*, Keene, N. H., was received by the Alumni Office, concerning a former student of Armour Institute. The article read as follows:

Attracting much attention in the window of Bergeron's men's clothing store on Main street this week is a large water-color painting of the "Tree of Jesse" window in Chartres cathedral, Paris, France. It is a reproduction by HAROLD H. SLAVITT, A. A'35, architectural designer and engineer of this city.

A legend on a card at one side of the display window notes that "This French medieval stained glass window shows the reclining figure of Jesse at the base of the tree and above him in successive order are the Four Kings, the Virgin Mary, and Jesus Christ. On either side are the disciples of Christ."

The drawing was executed by Mr. Slavitt while he was a student in the College of Architecture at Armour Institute of Technology, Chicago. It received second medal and honorary mention in a Chicago show and also honorary mention in a New York City show.

1936

DOLLENMAIER, HARRY R., E.E. A., may be reached at Ship Repair Office, Pearl Harbor Navy Yard, T.H. He is an ensign in the United States Navy Reserve.

HAEGER, ARTHUR JAMES, E.E. A., expects to be at the Air Corps Technical School, Keesler Field, Mississippi, for the duration. He is an instructor in the instrument branch of the Aviation Mechanics School.

MONELL, CHARLES E., A.S. L., a former instructor in mathematics at Lewis Institute division of I.I.T., evening school, is now an aviation cadet in training in California.

WARREN, GEORGE B., JR., A.S. L., is a officer candidate in the United States Army and is stationed at Co. 1, Class 17, C.W.S. Officer Candidate School, Edgewood Arsenal, Maryland.

1937

CIECHANOWICZ, EUGENE G., C.E. A., of Colonial Heights, Petersburg, Virginia, has been commissioned as an ensign in the United States Naval Reserve. Ensign Ciechanowicz, has been in charge of structural design, Atmospheric Nitrogen Corporation, in Hopewell, Virginia.

GOLOSMITH, ARTHUR, E.E. A., a former assistant in electrical engineering at the Armour College of Engineering is now a lieutenant (j.g.) in the United States Naval Reserve.

MAHLER, WILLIAM M., A.S. L., wrote recently, from Hollywood, Florida, as follows:

Mr. George Von Gehr, Pres.
Alumni Association
Dear Sir:

I want to thank you and the Alumni Association for its kind wishes as expressed in your letter of December 28th. Your letter brought to my mind the great debt I owe to Lewis, a debt constantly built up during the four years that I attended the Institute. It is a feeling of gratitude towards a school that gave help in all the ways it could and asked for nothing in return of its students or alumni.

In fact it asked so little of its graduates that as the years rolled by the alumni forgot that it should take time out now and then to return a vote of thanks to Lewis. Now that we have an active alumni association, I'm sure that the many others who feel the same toward the Institute as I do, will make it a point to show their appreciation through the association.

Sincerely,
(signed) WM. M. MAHLER, Ensign
U.S.N.R.

MINER, SYDNEY M., M.E. A., recently wrote this letter in answer to the letter from John Schommer.

Dear Uncle John:

Thanks much for your swell letter. The alumni association sure has a good bet in sending out "stuff" like that; especially, if they get more from you. Although I'm not so far from home yet, it was a real treat to read your letter—bright, newsy, and full of spirit. Sort of ties us all together and back to our old Alma Mater.

Thanks again, and good luck in all your ventures.

Sincerely,
SYD. MINER,

RALLEY, PAUL A., E.E. L., has returned to this country after a considerable length of time spent at Pearl Harbor in construction work both there and on Wake Island. Temporarily at least, he is located at the following address: 4138 North Whipple Street, Chicago, Illinois.

1938

JOE, WALTON C., A.S. L., wrote the following letter to the Alumni Office on January 13, 1943.

Dear Sir:

As my name appears in the "Where Are They" column in the last issue of the Technometer, I feel that I should tell something about my doings since graduation.

I am now working as a chemist at the Lewis Tar Products Company of McCook, Illinois. I have been employed by this company since May, 1941.

I am still single and expect to go to the army soon. I have often visited our alma mater and still follow with interest any news of my former classmates.

My permanent address is 1561 Howard Avenue, Chicago.

With my best wishes to everyone of you, I am

Yours very truly,
(signed) WALTON C. JOE

RUHIG, THEODORE F., A.S. L., is now a private first class stationed at the Mississippi Ordnance Plant, Jackson, Mississippi.

1939

ANTHON, HAROLD S., C.E. A., is now Captain Anthon Weather Officer, Great Falls, Montana.

CUMP, PERCY W., JR., C.E. A., wrote the alumni office and thanked it for the bulletins and publications sent out to him. He said that it made him feel that he is still in touch with the school. Lieutenant Cump's mailing address is 158th Inf., A.P.O. 827, c/o Postmaster, New Orleans, Louisiana.

PAPANTON, CH.E. A., who is research chemical engineer for the Prest-O-Lite Company, 16th and Main Streets, Indianapolis, Indiana, lives at 2246 North Talbot Avenue, Indianapolis, Indiana.

1940

BARLICK, ROBERT F., CH.E. A., has been promoted from aviation cadet to lieutenant in the United States Army and may be reached at Biggs Field, El Paso, Texas.

BASIC, ERNEST, E.E. A., a lieutenant in the United States Army, is located at Signal Corps, Electronics Training Group, A.P.O. 640, New York City, New York.

BORBAS, JOHN W., E.E. L., has been promoted from corporal to sergeant according to the following news release from Public Relations Office, Oklahoma City Air Depot, Tinker Field, Oklahoma City, Oklahoma.

Promotion of Corporal John W. Borbas, son of Mr. and Mrs. Geza Borbas, Holden, West Virginia, to the grade of sergeant has been announced by headquarters of the Oklahoma City Air Depot. He is attached to a headquarters squadron at this newest establishment of the Air Service Depot groups. Before his entrance into the Army, he was employed by the Island Creek Coal Company. Sergeant Borbas has been on duty here since August.

HOUSLEY, HOWARD G., M.E. L., has been transferred from Aberdeen Proving Grounds, Aberdeen, Maryland, to Camp Young, Indio, California.

JONES, CHARLES F., M.E. A., a lieutenant in the United States Army Air Force, took part on January 27, 1943, in the first big United States air raid on the German Reich.

KAGERER, RICHARD A., A.S. L., is a private in the United States Army.

LELAND, RAYMOND I., C.E. A., is a first lieutenant in the Sanitary Corps at Station Hospital, Camp Howzie, Texas.

LOMASNEY, PAUL H., A.S. L., is now a sergeant in the United States Air Corps according to a letter received in answer to John Schommer's letter of November 25th. The letter read as follows:

Dear Sir:

I received today a copy of your Nov. 25th greetings. I want to thank you very much for it, sir. I never was so fortunate as to meet you, for I went to Lewis Institute in 1935, before Lewis merged with Armour to make the Illinois Institute of Technology. My older brother Edmond did go to Armour and he surely did think the world of you.

It is with my sincere thanks, I remain
(signed) PAUL H. LOMASNEY.

QUANOFF, HARRY B., F.P.E. A., a former engineer and inspector for the Associated Factory Mutual Insurance Companies, Chicago, is now in the United States Naval Reserve at Annapolis, Maryland. His home address is 7710 South Winchester Avenue, Chicago.

RIDKER, MARTIN M., A.S. L., is a private in the United States Army.

SIEGEL, FLORENCE, H.E., L., is one of the first registered X-ray technicians in the Chicago area to be inducted into the newly organized hospital corps of the WAVES. She was sworn in on December 15, and expects to leave before the end of the month. Miss Siegel will spend five weeks in the indoctrination course at Iowa State Teachers' College, Cedar Falls, Iowa.

WEBER, RUPERT J., JR., C.E. A., is a lieutenant (j.g.) in the United States Navbl Reserve.

1941

BAUER, ELMER J., CH.E. I., an ensign in the United States Naval Reserve, is a student at the M.I.T. Radar School, United States Navy. His home address is 8 Otis Place, Boston, Massachusetts.

BEBB, DALE M., E.E. I., a lieutenant in the United States Army, is located at the Signal Corps Radar School, Camp Murphy, Florida.

BEARY, ALEXANDER R., C.E. I., is a lieutenant in the Marine Corps. His mailing address is VMSB 142, Mag. 14, Fleet Marine Aircraft Wing, c/o Postmaster, San Francisco, California.

BLAIDA, ANDREW S., M.E. I., has been promoted from second lieutenant to first lieutenant, and is located at Camp McCoy, Wisconsin.

BRERLEY, JOHN W., CH.E. I., has been transferred to the Boundbrook Plant of the Bakelite Corporation from the Bloomfield Plant. He is a plastic engineer for the company. He has moved to 711 Garden Street, Plainfield, New Jersey.

BURNS, WILLIAM F., M.E. I., has been transferred from Chanute Field, Rantoul, Illinois, to Lincoln Air Base, Lincoln, Nebraska.

DECKER, WILLIAM J., E.E. I., is a private in the United States Army.

GORICK, ANTHONY, JR., A. e., reported killed in action on December 22, 1942, is still alive and well, according to a special delivery letter received by his mother from the War Department.

HELLMAN, WILBERT M., M.E. I., is with the Coast and Geodetic Survey and is stationed on the west coast. He was married on November 21, 1942, and he and his wife are living at 7607 West Greenlake Way, Seattle, Washington.

JACOBSEN, ROY E., C.E. I., has been appointed an ensign after four months at Annapolis. His station at present is Subdivision 12, Key West, Florida.

PETTES, PHILIP E., M.E. I., has been promoted from aviation cadet to ensign in the United States Air Corps and may be reached at VP 71, Fleet Air Post Office, San Francisco, California.

PORGES, ARTHUR, M.S. I., A.S. L., is now a Second Lieutenant in the United States Army and is located at Camp White, Oregon.

PRANE

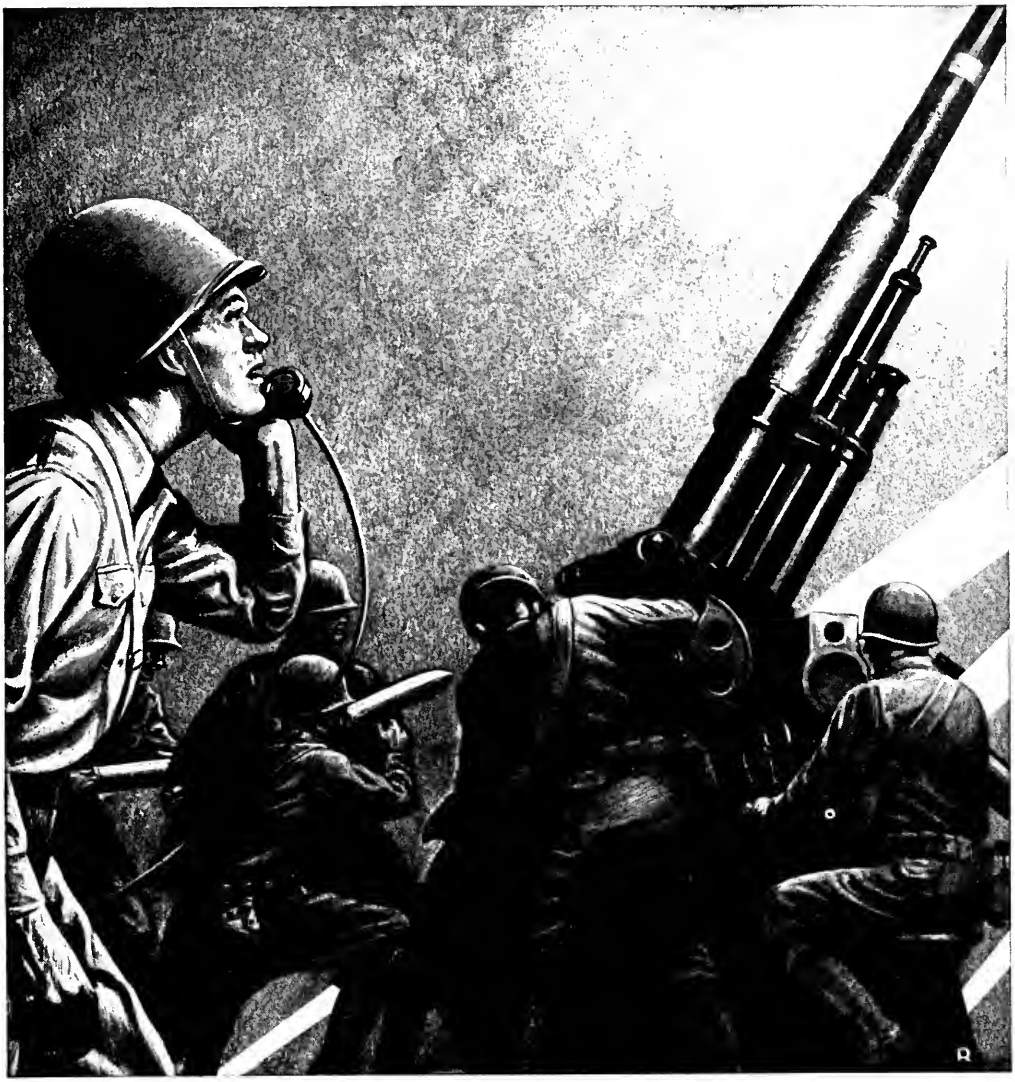
PRANE, ZENON M., CH.E., I., wrote this interesting letter to the Alumni Office.

Dear Sir:

As per your request, I am sending a photograph of myself, for use in the Illinois Tech's quarterly publication. At the present time, I am stationed as assistant to the resident inspector of naval material, at the Emerson Electric Plant, in St. Louis, Missouri, which is manufacturing aircraft turrets. The job is very interesting, and has given me an opportunity to acquire a tremendous amount of experience.

Henry J. Sliwa, Class of '41, Ch.E., is also stationed in St. Louis, working out of the Resident Office at 1955 Railway Exchange Building. Both he and I received promotions

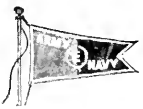
Every branch of the Armed Services uses the telephone. No. 1 of a series, Anti-Aircraft.



To his mother and dad it seems only yesterday that he was using the family telephone to call his high school sweetheart. But today the orders he sends and receives over his wartime telephone help speed the day when love and laughter, peace and progress shall again rule the world.

Western Electric

IN PEACE...SOURCE OF SUPPLY FOR THE BELL SYSTEM.
IN WAR...ARSENAL OF COMMUNICATIONS EQUIPMENT.



to lieutenant, (j.g.) last June. C. Bigos, Ch.E., Class of '40, is a lieutenant (j.g.), stationed on the U.S.S.Scott. Formerly, he was stationed at the Bureau of Ordnance, Washington, D. C. E. J. Boarini, Cb.E., Class of '41, is stationed in Pensacola, as a chemical warfare instructor. He also has numerous other duties, and a newly acquired wife. The event took place, October 3rd, in Chicago.

I hope this information will be of some benefit for the publication, and I will keep your office posted as I hear from the boys who are out with the service.

Very truly yours,
(signed) Z. M. Frane,
Lieut. (j.g.) O-V(S), USNR.

Seastrom, Lloyd P., A.S. I., recently wrote the following letter to the Alumni Office.

Dear Sir:

A few months back I received a blank form to fill out, concerning my present status. At that time I had no definite set of facts. I was in a period of transition from enlisted status to that of a commissioned officer.

As I have now reached that goal, as of December 3, 1942, I can give the information wanted. I am now a 2nd lieutenant in the field artillery.

Enclosed find a recent photo of me.

Yours truly,
(signed) Lloyd P. Seastrom

SEASTROM

Schmidt, Robert F., M.E. I., who is an ensign in the United States Naval Reserve, may be reached c/o Resident Salvage Officer, Pier 88, North River, New York City, New York.

Strutz, Arthur W., M.E. I., a lieutenant (j.g.) in the United States Naval Reserve, writes that he is stationed in the Territory of Hawaii. His correct mailing address is c/o Torpedo Shop, U. S. Naval Air Station, Kaneohe Bay, T. H.

West, James D., M.E. I., a former junior development engineer with the Cherry-Burrell Corporation (100% Defense), Little Falls, New York, is now a private in the United States Army. Before his induction into the Army, Wright Field, Dayton, Ohio, called him as Production Engineer (Civil Service), but the draft board wanted him too, so he was inducted at Columbus, Ohio, on December 1, 1942.

Zabrecky, John G., A. e., is a corporal in the United States Army, according to a letter received by the alumni office from his sister Margaret. The letter follows:

Dear Sir:

A few days ago a most interesting letter, which was addressed to my brother John F. Zabrecky, was received at this home.

At this time John is in Alaska. He was inducted into military service on November 18, 1941, and received his basic training at the Aberdeen Proving Grounds, Maryland.

John entered the United States Army as a private, but now he has received the advanced rating of sergeant technician.

I read the most interesting letter you sent for my brother, and I'm sure he will enjoy reading it too. I am going to forward this letter to him immediately.

Thank you again for thinking of my brother while he is serving his country.

Most sincerely yours,
(signed) Margaret Zabrecky.

1942

Bergstrom, Richard N., C.E. I., may be reached as follows: Ensign Richard N. Bergstrom, C.E.C., U.S.N.R., C.B.-Detachment 1001, c/o Fleet Post Office, New York City, New York.

Cibira, Stephen, M.E. I., was promoted from corporal to sergeant in the United States Army. He may be reached at Company E, 2nd C.W.S. Tng. Regt., Camp Sibert, Alabama.

Creagan, Robert J., F.P.E. I., wrote the following information on the back of a Christmas card to Professor J. B. Finnegan.

You may be interested in knowing where some of your old students are.

Ed Kaeser, F.P.E. '42, is working as safety and fire protection man for Remington in Bridgeport. Albert Garnier, F.P. E. '42, is a cryptographer in the Air Corps and is stationed at Pawling, New York. Dick Taylor, F.P.E. '42, is an ensign on duty in Washington. He tells me that he recently met Robert Kerney, who is taking a radio course, and Hackbarth, who was on the way West. Bill Suthers, F.P.E. '42, is a first lieutenant in the Anti-Tank Corps. Carl Sparenberg, F.P.E. '42, is in navigation school at Coral Gables, Florida. Dick Talcott, F.P.E. '42, is patrolling the Detroit River in a boat when he is off duty with the Michigan Inspection Bureau.

I am still at Yale, where I do a little teaching. I am trying for an M.S. degree in physics on February 1, 1943. For that date I am on 14-day notice from the Navy, having received my ensign's commission last summer. Yale and M.I.T. are quite different. Imagine Tech Hawks taking time off at four for tea. It seemed strange at first, but I am getting used to it. The institute gets some publicity here. I am enclosing a clipping from the New Haven *Register*. It may interest you.

Sincerely,
(signed) Robert J. Creagan

DeBoo, Emil A., M.E. I., an ensign in the United States Naval Reserve, is now stationed at San Diego, California. You may reach him at A. & R. Department—N.A.S., San Diego, California.

Minwegen, Art, Jr., C.E. I., has been made an assistant engineer, according to a letter from his dad which the alumni office received on January 12, 1943. The letter read as follows:

Dear Sir:

I thought that you might like to know that on January 1st, Art, C.E.I. '42, who is with the U. S. Corp of Engineers at the Soo, was made an assistant engineer; so you might want to put a little note in the next issue of the *Technometer* as I am sure that the other members of the class of '42 will be glad to know of this.

With kindest regard and best wishes.

Sincerely yours,
(signed) Art Minwegen, Sr.

Art, Jr.'s mailing address is 916 John Street, Sault Ste. Marie, Michigan.

Hackbarth, Wilbert H., F.P.E. I., an ensign in the United States Naval Reserve, may be reached by addressing his mail to U. S. Naval Reserve, Navy 229, c/o Fleet Postmaster, San Francisco, California.

Hiatt, John, M.E. I., is stationed at Great Lakes Naval Training Station after enlisting in the Navy. He has entered the Radar Division, with the ranking of petty officer, second class, radio technician. His mailing address is R.T. 2nd Class, 1-6, Co. 1809, U.F. N.T.S., Great Lakes, Illinois.

Patterson, Cecil E., Jr., M.E. I., a first lieutenant in the United States Army Air Corps, was decorated with the Silver Star, somewhere in the Middle East, on September 25, 1942. His residence address is 2814 Riverview Avenue, McKeesport, Pennsylvania.

Pellet, Lester, C.E. I., who formerly was stationed at Hickham Field, Territory of Hawaii, can be reached by sending mail to 7th Air Corps Sqd., A.P.O. 953, San Francisco, California.

Word has come to the Alumni Office that John Perkins, A.S. I., '42, as Co-pilot on a Flying Fortress, took part in a raid over France. Six FW's attacked his ship and the gunners believe that they shot down three.

Plourd, Webster W., M.E. I., is a captain in the United States Air Forces. His residence address is 15 College Street, Montgomery, Alabama.

Streit, Clarence T., M.E. I., an ensign in the United States Naval Reserve, has recently changed his mailing address to United States Naval Reserve, Production Division, Puget Sound Navy Yard, Bremerton, Washington.

Vizard, William F., E.E. I. New mailing address is Ensign William F. Vizard, U.S.N.R., 410 Memorial Drive, Riverside Apt. 102, Cambridge, Massachusetts.

Westphall, Joseph A., M.E. I., has received a written commendation from his captain for bravery and devotion to duty, according to a letter received from his mother by the alumni office. The letter read as follows:

Gentlemen:

I am enclosing a picture to be published in your paper of Ensign Joseph A. Westphall, U.S.N.R.

In his letter to me he wrote, "we are the gang that can tell the fellows on the Frisco what the fight was like after they left." He said they accounted for themselves all right and really dished it out.

He also received a written commendation from his captain for bravery and devotion to duty.

Thanking you, I remain

Very truly yours,
(signed) Mrs. W. F. Westphall

WESTPHAL

1943

Emerson, Robert G., M.E. I., is a prisoner of the Japanese in the Philippines, according to a recent newspaper article. The last message from him was a cablegram to his aunt and uncle, Mr. and Mrs. Jules Muller, 10743 Wood Street, Chicago, Illinois.

Knorr, John J., M.E. I., is a private in the United States Army.

Moore, George B., M.E. I., according to a recent newspaper article is a prisoner of the Japs in the Philippine Islands. Moore is a captain in the United States Army. He had been in the Philippines two years and was awarded the Silver Star for meritorious service. Mrs. Moore, George's mother, said that the last time she heard from him was on March 6, 1942, when she received a long letter in which he said that American troops had proven they can outfight the Japs if given anywhere near an even break.

Storey, Harry B., M.E. I., is with the Naval Air Corps, Glenview Airport, Glenview, Illinois.

1944

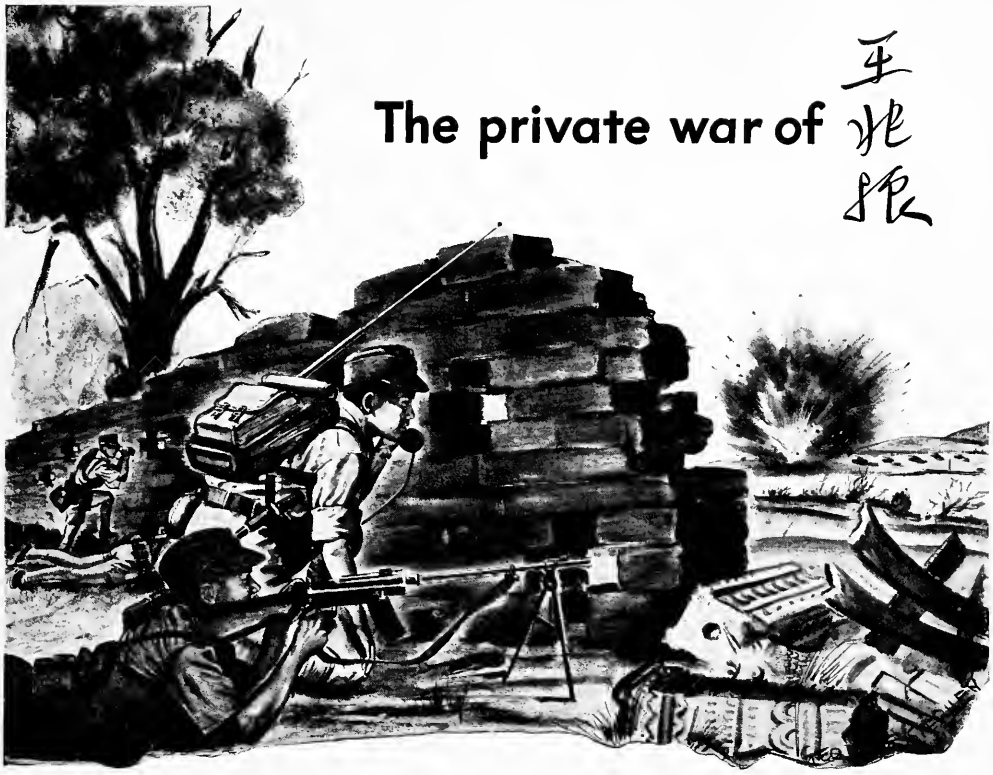
Coffer, Joseph M., A.S. I., of 312 North Central Avenue, Chicago Illinois is in the armed forces.

Ellis, Robert W., A.S. I., is a private, first class, in the United States Army. He enlisted in the Loyola University Hospital Unit 108, and is located at the LaGarde General Hospital, New Orleans, Louisiana.

Gilgenback, Roy, I. e., was awarded the coveted navy wings of gold on December 5, 1942, and was commissioned an ensign in the U. S. Naval Reserve at the Naval Air Training Center, Corpus Christi, Texas.

Ensign Gilgenback received his commission and the designation of naval aviator from Rear Admiral A. E. Montgomery, U.S.N., Commandant of the N.A.T.C., at graduation exercises for a large class of men. Gilgenback volunteered for flight training in January of last year and received preliminary instruction at the Naval Reserve Aviation Base at Glenview, Illinois. Upon successful completion of this training he was transferred to Corpus Christi for intermediate and advanced training at this "University of the Air," the world's largest naval aviation training center. In addition to flight instruction Gilgenback completed a thorough ground-school course, including navigation, radio code, gunnery and bombing theory and practice, communications, and other related subjects.

The private war of 王北辰



DR. CHAO-CHEN WANG carries a slide rule instead of a rifle. Logarithms are his bullets. Differential equations, his high explosives.

Yet he's waging just as deadly a war, against the hated Japs, as any of his brave compatriots in far off China.

For his is a war of electronics at work!

Since joining Westinghouse last summer, this young Chinese scientist has made several important contributions in the field of electronics design.

One of them—*a new method for measuring the output of ultra high frequency radio tubes*—may prove as valuable to the United Nations as a million machine-gun bullets fired at the enemy!

Dr. Wang is an expert in the mathematics of ultra high frequency communications. He does his "Jap fighting" in one of the Westinghouse Electronics Laboratories.

Here he employs his special genius in calculating — in advance — the performance and characteristics of electronic tubes *before* they actually take form.

★ ★ ★

DR. WANG, and other young engineers who enter our employ every year, are constantly contributing to the "know how" of the Westinghouse organization.

Westinghouse believes in helping young engineers grow and advance as rapidly as possible—for upon these scientists of tomorrow our whole future depends.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania.

TUNE IN the Westinghouse Program starring John Charles Thomas—NBC Network, Sunday, 2:30 P. M., Eastern War Time.

DR. CHAO-CHEN WANG studied electrical engineering at Chiaotung University in Shanghai. He was sent to Harvard University by the Chinese Government where he specialized in ultra high frequency communications. Before joining Westinghouse, he received his M. S., in 1938, and his Ph. D., in 1940.

Westinghouse

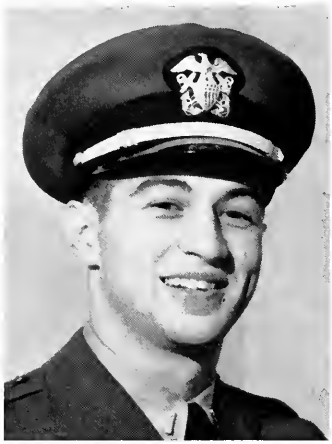
PLANTS IN 25 CITIES—OFFICES EVERYWHERE

HOFFMAN, JACK L., E.E. I., is a private in the United States Army. His residence address is 7040, 34th Street, Berwyn, Illinois.

KLEBECK, BERNARD S., C.E. I., has enlisted as an aviation cadet, in Class V-5 of the United States Naval Reserve.

MOULTON, HOWARD I., M.E. I., a private in the United States Army, is stationed at Camp Grant, Illinois. His mailing address is Area A, Bldg. T-129, Camp Grant, Illinois.

SHAW, ROBERT L., A.S. I., has been commissioned an ensign in the Navy (aviation) and is stationed at Purdue University taking further ground work and flight instruction. Prior to his signing up with Oak Park and River Forest Naval Aviation Squadron, "The Huskies", in August last year, Ensign Shaw had taken training at Palwaukee Airport, Roosevelt Aviation school at Mineola, New York, and the Alabama Institute of Aeronautics at Tuscaloosa, Alabama, and completed 190 hours of controlled flying. Bob's residence address is 921 Lake Street, Oak Park, Illinois.



SHAW

SOMMERS, WARREN A., M.E. I., according to a news release from the U. S. Naval Air Station, Corpus Christi, Texas, was commissioned an ensign in the U. S. Naval Reserve and was designated a naval aviator at the weekly graduation ceremony held on December 12, 1942, at the Naval Air Training Center, Corpus Christi, Texas. Immediately following the ceremony, Sommers and his classmates pinned on their navy wings, distinguishing mark of the naval aviator.

1945

BORLING, GLENN, M.E. I., is in the United States Navy and may be reached at U.S.N.T.S. Comp. 1875, Great Lakes, Illinois.

EFFENBERGER, HAROLD C., I. e., has enlisted as an aviation cadet, in Class V-5 of the United States Naval Reserve.

HUBER, RICHARD, E.E. I., and his father Harold F. Huber, 2642 Carmen Avenue, Chicago, were sworn into the Navy November 24, 1942 and are now completing a six-weeks course at Great Lakes, Illinois. Richard Huber is a 3rd class petty officer and may be reached by addressing his mail to Co. 1770, 31st Reg., 56th Btn., Ogreen Bay (camp), U.S.N.T.S., Great Lakes, Illinois.

KRYPEL, RAYMOND I., M.E. I., is in the United States Navy and is stationed at Great Lakes, Illinois. He is a radio technician, 3rd class, and may be reached at Company 1870, U.S.N. T.S., Great Lakes, Illinois.

MASSETT, ANTHONY L., A. e., was graduated as honor man of his company at Great Lakes Naval Training Station. He will attend one of the Navy's service schools. He holds the rank of fireman, 1st class.

MOULTON, HARPER W., A.S. I., is a private in the Signal Corps, United States Army. His residence address is 929 North Cherry Street, Wheaton, Illinois.

PENNINGTON, NEIL, A.S. I., is a glider pilot in training with the United States Army Air Corps at Rock Island, Illinois.

SIMPSON, GEORGE E., I. e., according to a news release from the Public Relations Office, Air Force Advanced Flying School, Stockton Field, California, is a member of a class which will be graduated soon from that school. The graduates will be commissioned second lieutenants in the Air Force Reserve and will be given their wings. They will be placed on active duty in their new rank with the Army Air Force. Before entering the final and advanced course at Stockton Field, Cadet Simpson completed 18 weeks of primary and basic training at Sequoia Field and Merced, California. Cadet George's residence address is 331 Earl Street, Joliet, Illinois.

ENGAGEMENTS

1940

Wedding plans for Miss Helen Clark and LT. WILLIAM F. YEAGER, M.E. A., depend, as usual these days, on the bridegroom's leave. They were planning tentatively on a January wedding, when Lt. Yeager thought he might be able to make the trip east from his post at the Enid Army Flying School in Oklahoma, where he is stationed as an engineering officer. Their engagement was recently announced by Miss Clark's parents.

1941

The engagement of NATHANIEL STETSON, Ch.E. I., to Helen Elizabeth Casey was announced by her Aunt and Uncle, Mr. and Mrs. William H. McClean. The wedding will take place in the near future.

Mrs. Marion B. Johnson, of 2428 Twentieth Street, Washington, D. C., has announced the engagement of her daughter, Miss Patricia G. Johnson, to LIEUTENANT (j.g.), RICHARD L. PARKIN, Ch.E. I., United States Naval Reserve, son of the Rev. and Mrs. Charles A. Parkin, of Lake Geneva, Wisconsin.

MARRIAGES

1936

WALDMANN, JOHN G., M.E. A., a lieutenant in the United States Navy, was married to Miss Laura Achsa on November 7, 1942, at St. Stephen's Church, Seattle, Washington.

1938

ALEXANDER, MAURICE, C.E. A., was married to Miss Jean Krowitz on December 6, 1942, at Jacksonville, Florida. Mr. Alexander is a second lieutenant in the Corps of Engineers, United States Army.

1941

KAIRIS, ALDA E., A.S. I., became the wife of WILLIAM F. MASSMAN, JR., Ch.E. I., on December 26, 1942. They are now living at 15 Everett, Cambridge, Massachusetts. Mr. Massman is an ensign in the United States Naval Reserve and Mr. Massman is with Civil Service.

1942

COLLOFF, ISADORE, E.E. I., was married to Miss Shirley Dessen on November 8, 1942. The ceremony was performed by Rabbi Peretz Dessen, uncle of the bride, and Rabbi I. Levine, of St. Joseph, Missouri, at the home of the bride's parents. Mr. Colloff now holds a position as radio engineer in the Signal Corps, Radar Laboratories, at Asbury Park, New Jersey. Following a brief honeymoon the couple are now residing in Asbury Park, New Jersey.

MILLER, DANIEL F., Ch.E. I., an ensign in the United States Navy, was married on October 13, 1942 to Miss Anna Rosemary Reichart. The ceremony was performed at St. Hilary's Church with a reception at the Admiral Hotel. Ensign Miller is now overseas.

RAPP, JOHN W., M.E. I., and Miss Margaret Toomey were married on October 31, 1942. Their wedding took place in the St. Sabina Church rectory. Mr. Rapp is employed as superintendent of the Foote Axle Company, 47th Street and Western Avenue, Chicago.

SCHWARZ, WILLIAM I. e., was recently married to Miss Doris Jane Shiffer. The ceremony, a candlelight service, took place in the Immanuel Evangelical and Reformed Church. They will make their home in the Southtown district of Chicago.

BIRTHS

1935-1937

Charmaine Tetik was born on Christmas Day to ROSE (KOHOUT) TETIK, A.S. L., '37 and ROBERT TETIK, A.S. L. '35.

MISSING IN ACTION

1932

LIEUTENANT FREDERICK C. HARRINGTON, L. e., former field engineer in the Cable Division of the construction department of Commonwealth Edison Company, was reported missing in action following a naval engagement in the Solomon Islands area. He was stationed aboard the U. S. aircraft carrier Wasp which was sunk on September 15 following a submarine attack.

1937

LIEUTENANT ROBERT K. FREEMAN, F.P.E. A., a bomber pilot with the Army Air Forces, was killed in action December 2nd in the Southwest Pacific. Lieutenant Freeman, who enlisted in the Army Air Forces in January, 1941, had the highest average in his class at Kelly Field; 99.2 per cent. He was 27 years old, a veteran of Pearl Harbor and the Midway battle, and had been assigned to Gen. MacArthur's command in Australia since October 6, 1942.

1941

SERGEANT HARRY R. BEALLES, I. e., 26 years old, a member of a medical corps detachment of the United States Army, was killed in action in New Guinea. Sergeant Bealles was one of 25 medical men who volunteered to move a portable hospital up near the front line action, and while caring for wounded men near the fighting lines, he was shot by a low-flying Japanese Zero plane.

DIETCH, WILLIAM A., A.S. I., according to a recent newspaper article was awarded the Silver Star for heroism in action against the Japanese near New Guinea. Mr. Dietch, a lieutenant in the United States Army Air Corps was reported missing in action on September 16, 1942, by the War Department. He was navigator of a B-17 aircraft which was on bombardment missions over enemy territory. The result of one mission was the sinking or damaging of four enemy ships in Rabaul Harbor.

OBITUARIES

1898

PATTEN, GEORGE H., B.E. A., died unexpectedly on November 21, 1942, as the result of a heart attack. A citizen of Chattanonga, Tennessee, for many years, George Patten had become that city's best known and most beloved citizen. He had spent a lifetime, in addition to his many business pursuits, in leading and directing financial campaigns for welfare, charitable, and other worthy causes. At the time of his death he was general chairman of the Greater Chattanooga War Fund. George Patten was active in church work and was a member of many civic organizations.

1909

BANG, WILLIAM H., M.E. L., passed away during December, 1942. He had retired in 1941 after having been vice-president of Illinois Bell Telephone Company for several years.

1919

BADENOCH, HELEN I., Ac. L., passed away on December 21, 1942, after a lengthy illness. Miss Badenoch had been a member of the faculty of Denison University, Granville, Ohio, for more than 17 years.

1926

NOYES, JOHN H., A.S. L., and his wife Dorothea lost their lives in the tragic Boston night-club fire last November. They are survived by their two children.

1943

BROUK, ROBERT R., A.S. L., a captain in the United States Army Air Force, was killed in a pursuit plane collision near Orlando, Florida, in December, 1942. Brouk, who resigned from the Army Air Force in 1940, fought for 10 months as a Flying Tiger—protecting the Burma Road. Three weeks before his fatal accident, Captain Brouk had been married to Virginia Scherer, at Oak Park, Illinois.

1944

ERICKSON, ROY W., A. I., an aviation cadet, was killed while making a routine flight with a civilian flight instructor.

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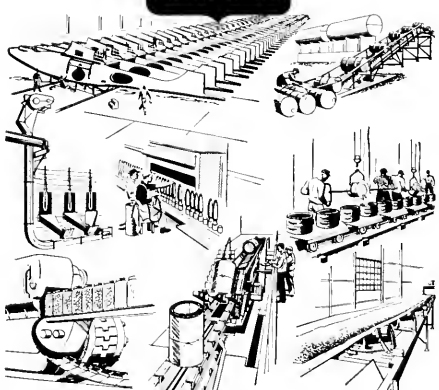

● Expediting Victory . . . by speeding production schedules, through faster movement of materials, parts and products . . . that's the war job of conveyor systems. Costs tumble—hours are saved—wasted motions disappear. Manual operations—tuned to the streamlined pace of the conveyor—achieve highest efficiency. The smooth, continuous movement of a conveyor system is production science at its peak.

For over half a century Link-Belt has specialized in the engineering and manufacture of every type of mechanical elevating and conveying equipment for practically every industry and material. Link-Belt engineers are ready to assist in the proper application of the right type of conveyor system to save money and man power, speed production and produce more uniform output.

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WHAT'S COOKIN'

(From page 11)

additional support to existent ideas on these effects.

Mr. Eugene H. Stevenson has started work on a spectroscopic study of the products which are obtained in the synthesis which was once supposed to produce spiropentane (a compound in which the carbon atoms should have a figure 8 arrangement), but which instead produces other compounds of spectroscopic interest.

Two other controversies over classical molecular structure concern the arrangement of atoms in aldol and in diketene; both of these compounds will assume increasing industrial importance in the near future. These are at present being studied by Messrs. Saunders and Taufen, respectively.

Not all research projects actually carried out by resident members of the Chemistry Department have been covered in this article. Moreover, there is included above no discussion of the research of those who are no longer members of the department and of those who serve as part-time members of the staff (evening school). Likewise is omitted the work of staff members on leave of absence. The work of Dr. V. I. Komarewsky is largely of a chemical nature, and several graduate students majoring in chemistry have done research under his direction. However, Dr. Komarewsky, himself, is on the staff of the Department of Chemical Engineering and his work will be covered in a later article from that department.

Dr. B. B. Freud, Chairman of the Department, now on leave as Colonel in the Army, merits the credit for having so well organized a research group that it functions efficiently as a unit although each member has his own separate interests.

The author wishes to acknowledge the assistance of his colleagues in preparing this manuscript, some sections of which have been taken almost verbatim from their reports, and to express his appreciation of their harmoniousness and active interest in research.

Below are listed the things that have been "cooking" in the Chemistry Department research laboratories long enough to be reported in the current scientific literature. Other reports have been submited to editors. More manuscripts are in preparation, and still other investigations have received preliminary airings at scientific meetings.

RESEARCH ARTICLES 1939-1942

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The Systems Ethyl Alcohol-Glycerol-Carbon Tetrachloride at 25 Degrees, H. J. McDonald, A. F. Kluender, R. W. Lane; Journal of Physical Chemistry, 46, 946 (1942).

Analytical Data for the Systems Carbon Tetrachloride, Tetrachloro-ethylene, and Carbon Tetrachloride, Benzene, Acetic Acid, W. R. McMillan, H. J. McDonald; Industrial and Engineering Chemistry, Analytical Edition (in press).

Rearrangements in the Truxillic and Their Bearing Upon Theories of Molecular Rearrangement and Optical Rotatary Power; H. I. Bernstein; Journal of Organic Chemistry, 7, 261 (1942).

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Simultaneous Chemical Reaction and Fractional Distillation: Isomerization, B. Longtin; Industrial and Engineering Chemistry, 34, 292-295 (Unit Process Symposium, March, 1942). (with Randall).

Heats of Mixing in the Ternary System Ethanol Acetic Acid-Ethyl Acetate by a Rapid Approximate Method, B. Longtin; Journal of Physical Chemistry, 46, 399-405 (1942).

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The Role of Neighboring Groups in Replacement Reactions, I. S. Winstein and R. E. Buckles; Journal of the American Chemical Society, 64, 2780 (1942).

The Role of Neighboring Groups in Replacement Reactions, II. S. Winstein and R. E. Buckles; Journal of the American Chemical Society, 64, 2787 (1942).

The Role of Neighboring Groups in Replacement Reactions, III. S. Winstein; Journal of American Chemical Society, 64, 2791 (1942).

The Role of Neighboring Groups in Replacement Reactions, IV. S. Winstein, H. V. Hess and R. E. Buckles; Journal of the American Chemical Society, 64, 2796 (1942).

Raman Spectra of Acetylenes, II. Displacements and Depolarization Factors of Phenylacetylene and Derivatives of the type C H ≡ C R, M. J. Murray, F. F. Cleveland; Journal of the American Chemical Society, 61, 3546-3549 (1939).

Raman Spectra of Simple Ethers, F. F. Cleveland, M. J. Murray, Herschel H. Haney and Julia Shackelford; Journal of Chemical Physics, 8, 153-156 (1940).

Infra-Red Absorption Spectrum of Methylphenylacetylene, M. J. Murray, F. F. Cleveland; Journal of Chemical Physics, 8, 133-134 (1940).

Raman Spectra of Acetylenes, III. Five Mono-substituted and Four Disubstituted Acetylenes, F. F. Cleveland, M. J. Murray; Journal of the American Chemical Society, 62, 3185-3188 (1940).

Raman Spectrum of 1-Bromo-Dodecane, F. F. Cleveland, M. J. Murray; Journal of Chemical Physics, 8, 867-868 (1940).

Raman Spectra of Some Ethers Containing One or More Phenyl Groups, M. J. Murray, F. F. Cleveland; Journal of Chemical Physics, 9, 129-132 (1941).

Atmospheric Oxidation of 6-Dodecene, M. J. Murray, F. F. Cleveland; Journal of the American Chemical Society, 63, 1363-1364 (1941).

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Raman Spectra Evidence for Hindrance of Resonance by Ortho Substitution, Robert H. Saunders, M. J. Murray and F. F. Cleveland; Journal of the American Chemical Society, 63, 3121-3123 (1941).

Effect of Silver Ion Coordination upon the Raman Spectra of Some Unsaturated Compounds, Harvey J. Taufen, M. J. Murray and F. F. Cleveland; Journal of the American Chemical Society, 63, 3500-3503 (1941).

Raman Spectra of Some Aliphatic Ketones, F. F. Cleveland, M. J. Murray, J. R. Coley and V. I. Komarewsky; Journal of Chemical Physics, 10, 18-21 (1942).

Raman Spectra of Acetylenes. VI. 1-Butyne, 1-Pentyne, 1-Hexyne, 3-Hexyne, 4-Octyne and 1-Chloro-1-Heptyne, F. F. Cleveland, M. J. Murray and H. J. Taufen; Journal of Chemical Physics, 10, 172-176 (1942).

Raman Spectra of Some Aromatic Carbonyl and Nitro Compounds, M. J. Murray, F. F. Cleveland and Robert H. Saunders; Journal of the American Chemical Society, 64, 1181-1184 (1942).

Association Effects in the Raman Spectra of Thiophenol in Donor Solvents, Robert H. Saunders, M. J. Murray and F. F. Cleveland; Journal of the American Chemical Society, 64, 1230-1231 (1942).

FRESHMEN

(From page 14)

ANSWERS TO SAMPLE QUIZ QUESTIONS

1. Black cloth; 2. Mississippi; 3. Francis Scott Key; 4. 16 to 9; 5. The Rime of the Ancient Mariner; 6. Time flies; 7. Pennsylvania; 8. Russia; 9. Paul Revere; 10. Socrates.

YELLOTT

(From page 16)

to one whose work lies in the field of technical education. Always of great importance to the nation, technical education in these critical times becomes vital to our victory in the war and in the peace which will follow.

I do not decry the value of the liberal arts, and I count myself fortunate indeed to have been able to study languages, literature and history before entering upon the technical phase of my education. I hope most sincerely that, after this war, engineering education may be broadened until every engineer can hold his own with his fellows in the other professions.

I feel that the War Training Program may expedite this desirable end, because we in the colleges have learned much about the art or science of technical training and much of the sacred tradition has been swept away as our curricula are accelerated by the war. Also, the War Training Program has brought new thousands of subprofessional workers into technical fields, and the fully-trained engineer will, in the future, be used more frequently in those positions where only he is equipped to serve.

In this period, when our nation draws closer to total war and to

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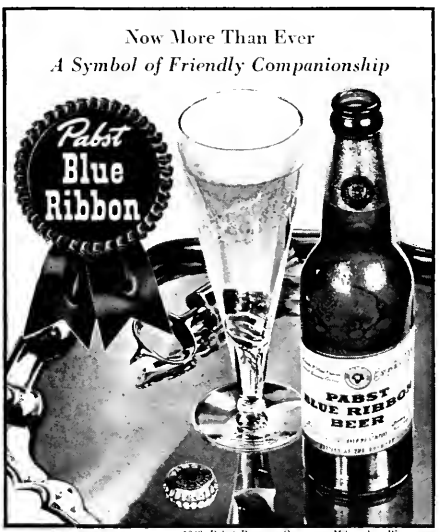
"FRANKLY—we've discovered that sharing our car, instead of being a hardship, is really a blessing in disguise.

"For neighbors who formerly were little more than nodding acquaintances are beginning to drop in evenings for a game of bridge—or a friendly chat over a glass of Pabst Blue Ribbon Beer.

"Like a lot of other folks, I guess we are just rediscovering how much real pleasure there is in home and simple hospitality..."

With wartime restrictions bringing a new appreciation of home and hearth, Pabst Blue Ribbon Beer has become, more than ever, a symbol of friendly companionship.

That softer, kindlier taste of Pabst Blue Ribbon is achieved by FULL-FLAVOR BLENDING—a Pabst process that gives you all the taste tones of a well-rounded beer. Not just 3, nor 5, nor 7 or 8 brews—but no less than 33 master brews are skillfully "woven" into one great beer. There is no finer, friendlier beer in all the world than Pabst Blue Ribbon.



the total mobilization of its vast resources, every institution must justify its existence by that same harsh criterion which also applies to every individual—"Can you work or can you fight?" The engineering colleges can rightly reply—"We can do both." Our regular students no longer follow a slow and leisurely path to a four-year degree. Instead, vacations have gone to some forgotten limbo with the Sunday afternoon pleasure trip and the second cup of coffee, and our young men now enter upon eight consecutive semesters of continuous study. Many of our alumni are in the armed services; many more are in essential occupations in critical industries.

The relatively small number of engineers who will graduate this year have an importance which is out of all proportion to their actual number. Of all our national resources, they are among the most valuable. Any physically fit young American will make a good soldier—the decadence of American young men has been proven by the heroism of Bataan and Casablanca to be as silly a myth as the alleged invincibility of the Nazis—a young engineer can pilot a fighter plane with daring and cool courage but so can an arts student or a high school graduate. The difference between the engineer and his contemporaries lies in the fact that he alone can design the engine which lifts the plane into the sky at a mile a minute, he alone can design a plane which can dive as fast as sound itself and yet not shed its wings, he alone can help to build the gasoline plant which gives life to an otherwise earth-bound thing.

For the first two years of this war, the United Nations suffered one Dunkirk after another, and always the cry was "too little and too late." No braver men ever lived than the Dutch, the Belgians, the Chinese, the British and the Americans who, time after time, were pushed into the sea by better-armed opponents. American industry, counseled by American engineers, has supplied the answer to the legend of the superman—the real superman is the American fighting man, armed with a submachine gun which fires cartridges made where formerly the juke box grew, coming ashore in an Illinois-built landing barge, powered by diesels from La Grange, with a stream of tanks behind him coming from the plants of Hegewisch and Gary. Above him roars a veritable cloud of four-motored bombers, made of aluminum which might well be marked "rolled in Chicago," powered by great engines which are the product of Detroit's automotive genius, and guided to their destination by radios which flow from plants where formerly flourished the telephone.

These mechanical and electrical miracles are the products of the home army, the army of industry, and without them the fighting army will, despite its courage, continue to stage heroic retreats and masterful delaying actions. With these weapons, our men will see how well the enemy withdraws to previously prepared positions, how tenaciously he holds in the face of superior forces, how he enjoys the nightly visitations of unhampered flights of bombers.

We at the Illinois Institute of Technology realize our responsibility to the people and to the industries of Chicago. For the duration of the war our every effort must be directed towards passing the ammunition. With the coming of peace, we will join in praising the Lord, and helping to build and to maintain the better life.

P. O. R.

WEST SIDE

(From page 19)

was the student newspaper office, and the embryo scribes have unscrewed their typewriters from their desks and set up offices wherever possible whenever copy is to be written. They have since moved into a former store room. The English department uses a former student meeting room as its headquarters. When three or four faculty members have moved out to make room for war-training instructors, eight or ten have moved into the same office. Smaller desks are used and lined against the walls. One office originally built for one person now holds five. And to give additional office space, a garage has gone into service. Originally built in World War I to house laboratories for war trainees, it was converted into a garage after the war, and now in World War II it has been remodeled to provide headquarters for the Signal Corps program. Classrooms and laboratories occupy this building. Instructors who teach only evening classes have had to forego the privilege of offices as a war time sacrifice; they just carry their "offices" home with them each night.

But everyone on Illinois Tech's west campus has learned that all the inconveniences caused by crowding six students in where there should be just one are all a part of the task of winning the war. One has to become good humored about it all, for Illinois Tech is sponsoring so many different programs, and new sections begin in each at such varying times, that there must be a constant juggling of space. Once a classroom and laboratory schedule is set up and functioning smoothly, another new course begins and reorganization is again necessary. Illinois Tech officials won't even guess any more as to what the maximum training capacity of the west campus might be—if they really did crowd things.

The rehabilitation of the garage accounts for reclaiming from uses other than for instructional activities of about 13,000 square feet of floor space. This is being used now for the Pre-Radar course. About 16,000 other square feet were gained for training programs by the determination to get every possible cubic foot of the main building into educational production. It took a war to push us into one sound principle efficient plant management, that is, to wear the plant out as quickly as possible with efficient and optimum production.

RELAYS

(From page 20)

Defending champions are Michigan State in the university division and Loyola in the college division.

In years gone by, the college section has usually been the feature of the meet as competition has been keener and more teams have been entered. The largest number of university team to be entered in any one Relays has been ten.

In requesting Schommer to continue the meet, at least ten major universities have already indicated that they will enter men. These include Wisconsin, Northwestern, Chicago, Minnesota, Ohio State, Illinois, Michigan, Michigan State, Notre Dame, and Drake.

In the college class, where from twenty-five to thirty-five teams have competed for the last eight years, interest is already at a peak, as these

schools point for the Illinois Tech Relays this year. Only possible handicap to this phase of the meet will be the fact that two small college conferences have dropped indoor track, but, of course, this won't bar them from competing in the Tech Relays.

"Despite the fact that our track teams have not fared so well (the Techawks haven't won their own meet since 1930), we are always glad to continue to hold the Illinois Tech Relays because we believe that it helps make Chicago a track center," says Schommer. P.O.R.

FORESIGHT

Officials of Illinois Institute of Technology could well be singing "We told you so," if they chose to adopt that chorus.

For in 1940, nearly a year and one-half before Pearl Harbor and two years before the troublesome days of the summer of 1942, six "war and defense preparedness" leaders of the Institute did everything except predict Pearl Harbor. Had their advice been heeded, it seems likely that the troubled days of 1942 would have been far less troublesome.

Those six men were the leaders in the "War Defense and Preparedness Program" at Armour—before the merger with Lewis Institute that resulted in Illinois Institute of Technology—held that summer to study problems of what was then known as national defense.

A major feature of that program was a panel discussion, in which the six engineering authorities threshed out the question of American defense. That was shortly after the fall of France, before the darkest days of the Battle of Britain, before military conscription was more than a speculation, before Adolf Hitler and Joseph Stalin broke their partnership—and long, long before Dec. 7, 1941, the day that eventually placed these six engineers among history's wise men.

Seven points summarized the findings of the panel at Armour. And every one of these points has proven literally true gospel in the fateful months since July, 1940.

1. "A tough dose of regimentation, conscription and youth training would make the United States the strongest military power on earth in two years."

Conscription became a reality a few months after that statement was issued. Now it has been accelerated to a point where the country hopes soon to be in that dominant position which the six engineers said was possible.

2. "The nation has ample food and petroleum supplies to provide an army and avoid rationing of civilian supplies."

The first part of that statement is true, but civilian rationing has become necessary. In addition to supplying itself, the United States has been sending both food and petroleum products to the rest of the United Nations for many months.

3. "Engineers must be trained to avoid a production bottleneck through a shortage of industrial experts."

A few months after that statement was issued, the United States Office of Education inaugurated the Engineering Defense Training program, under which to date approximately more than 500,000 persons either have been trained or are now studying specialized phases of war-industry engineering. The program is still being expanded, for the demand far exceeds the supply.

4. "Airplanes, radios, tanks and other engines of war must be simplified to the point where they can be operated efficiently by comparatively unskilled men."

Here the experts partially "missed the boat"—but qualifications have been lowered in both the air force and the signal corps in an effort to obtain the millions of men needed to operate the equipment being produced. Whereas nothing short of college graduation could get a man into the air force in the late thirties, today high school education is sufficient.

5. "The United States can expand its production plant easily, but needs expert engineers to develop new war weapons and improve on old weapons."

Production has expanded far beyond expectations since that day—and is still crying for more engineers. Industrial authorities say that 80,000 engineers are needed today—and all the engineering schools in the nation graduate only about 14,000 annually. Practically every one of those schools has some kind of acceleration program to help fill that need.

6. "The present American preparedness program is entirely too slow to bring about military supremacy or equality within two years."

That was more than two years ago—and today Hitler is still in the Ukraine, the Japanese have the Philippines and the Burma Road and stand at Australia's front door, and both an offensive front in the Orient and a second front in Europe are still in the speculative stage.

7. "The $15,000,000,000 so far appropriated for preparedness is wholly insufficient for the nation's defense needs."

Since that day, vastly greater sums have been spent and government experts say that is only the beginning.

That summary becomes even more significant in view of the fact that it was made in the days when most Americans—outside the administration—were still arguing about isolation, worry about the $15,000,000,000 being added to the national debt, and opposing military conscription as "un-American."

The experts included on the panel were Lydik S. Jacobson, Stanford University's expert on earthquake-proof architecture who has since turned his attention to air raid shelters; C. C. Furnas, Yale University chemical engineer; William L. Everitt, Ohio State expert on communications; G. B. Karelitz, Columbia University mechanical engineer; V. I. Komarewsky, Armour's expert on petroleum; and L. E. Grinter, then vice-president of Armour and now of Illinois Tech, all members of the staff that administered Armour's "war defense and preparedness program" during the summer of 1940.

P. O. R.

CROP PRODUCTION SPECIALISTS IN RUBBER, OIL-PRODUCING, AND TROPICAL PLANTS NEEDED

Persons with a practical knowledge of the production of rubber and oil-producing crops and other tropical plants, including the procurement of wild rubber, are being sought for Federal employment, the Civil Service Commission has announced.

The positions range from chief crop production specialist, at $8,000 a year, to the assistant grade at $2,600 a year. Overtime on the basis of a standard work week of 48 hours (which includes 8 hours overtime) is paid on salaries up to $5,000 a year. While some positions will be filled in the United States, a majority of them will be filled outside its continental limits, principally in the South and Central American countries. Additional compensation will be paid to persons appointed for duty outside the United States, to be determined by the location of the position. Applicants who have a speaking knowledge of Spanish, Portuguese, or French should include this information in their application forms.

Persons appointed will do work in connection with the establishment and operation of research stations or plantations growing rubber of oil-producing plants. Plantations will be situated, for the most part, in remote and primitive areas.

ANY IDEAS?

At The Engineer School, Fort Belvoir, Virginia, incoming mail is read with that eager anticipation usually known only to the hunter and to the fisherman. For that school operates a suggestion system. Any envelope in any day's mail may be drama-drenched and thrill-freighted with a revolutionary suggestion which will speed victory.

The suggestion system is more than a year old. To date eleven per cent of the suggestions have been approved and put to use. More suggestions are wanted. An extensive campaign to promote suggestions has been started. Illustrated posters have been distributed for platoon bulletin boards of engineer organizations. New posters will be distributed each month. Engineer soldiers are authorized to send suggestions direct without going through other military channels.

Civilians also are welcome to send suggestions. No useful idea is too small to report. Every idea is judged by competent critics. Every suggestion is copied and submitted to the critics without any indication of its source. Approval does not depend on rank or influence. The private and the brigadier are treated alike. Each suggestion wins in The American Way —solely on its own merits.

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YOU CAN SEE why metalworkers call this lump of calcium metal a "carrot." This is the way it looks when it comes from an electrolytic cell in which it is made.

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In the making of stainless or high-alloy steels, calcium drives out impurities, giving cleaner, better steel for casting or rolling. In magnesium casting, small amounts of calcium improve the finish of the surface and minimize scaling. Calcium is an essential in the making of many metals.

This hitherto rare metal has been made in this country only during the past few years. Before Europe exploded, the United States was dependent upon France as a source of supply.

But back as far as 1935, thinking that this country should have a domestic source, ELECTRO METALLURGICAL COMPANY, a unit of UCC, started a major research program. After four years of work . . . as French supplies dwindled . . . a plant was put into operation for the manufacture of the gray metal. Today, ELECTRO METALLURGICAL COMPANY produces many times as much calcium metal as this country ever imported . . . and production is increasing.

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POWER CONFERENCE . .

(From page 21)

(b) Effect of Fuel Composition on Deposition in Diesel Engines. L. E. Hebl, Head, Engine Laboratory, and L. W. Griffith, Senior Research Engineer, Shell Oil Co., Wood River, Ill.

(c) Discussion.

3:45 P.M.—Fuels and Combustion, R. E. Summers, Chairman.

(a) Effect of Coal Sizing on Efficiency and Operation of Mechanical Stokers. Otto de Lorenzi, Assistant General Sales Manager, Combustion Engineering Co., New York.

(b) Possibilities and Limitations of Small Hand-Fired Furnaces. J. R. Fellows, Assistant Professor of Mechanical Engineering, University of Illinois.

(c) Discussion.

For copies of the final program and for other information, address Stanton E. Winston, Conference Director, or Charles A. Nash, Conference Secretary, Illinois Institute of Technology, 3300 Federal Street, Chicago, Illinois.

BOOK SHELF

(From page 25)

poodles, who walk so easily upon their hind legs, ever do learn the little tricks of speech and reason, I should not be surprised if they made a better job of it than Man, who would seem to be slowly slipping back to all fours . . . " Here we are, not so far from Gulliver's world of the Horses and the Yahoos. To speak of differences, the greatest one between the two men is that Swift satirized in the hope that improvement might occur. Thurber has given up any such hope. The mockery (and the autobiography?) of the following passage does not conceal the essential seriousness of the words:

> We are trapped in consciousness, trapped by mortality, trapped inside an inadequate animal body, trapped within the poor limitations of the human spirit. Some of us . . . also happen to be caught in smaller prisons within the larger ones, like a mouse in a trap in Sing Sing. This type of badgered human being is given to the short, nervous essay rather than to the 972-page novel or autobiography. He is more likely to fret about the discomforts of his particular cell than to concern himself with the prison problems as a

whole. You will find him in bed groaning when other people are up lecturing. This frailty, this preoccupation with, and affinity for, the smaller enormities of life, permits him to be overwhelmed by minor tyrannies and persecutions to the extent that, for days on end, he forgets his part in the struggle for that larger Freedom which now engages the attention of all right-minded prisoners of the world.

Thurber's title, then, is a restatement as ironically admiring and complex as Hamlet's peroration, "What a piece of work is a man . . .", or of Pope's description of man as "The glory, jest, and riddle of the world."

These literary comparisons make Thurber sound pompous and in danger of being Classic. Heaven forbid! He is the antithesis of the stuffed shirt. *My World—And Welcome To It* is a humorous series of observations and stories from one of the sharpest observers of ridiculous man. Thurber's awareness of the trivial is as delightful at times as Sterne's. Thurber should, but he wouldn't, cry with Sterne, "Vive la bagatelle", for therein lies his best work. He has an eye and an affection for the amusing and incongruous such as Della, the demon of the Dictionary, Shakespearean critics, or the jargon of hobbyists. And he has a sense for character. The opening sentences of "Here Lies Miss Groby" illustrates the point:

> Miss Groby taught me English composition thirty years ago. It wasn't what the prose said that interested Miss Groby; it was the way prose said it. The shape of a sentence crucified on a blackboard (parsed, she called it) brought a light to her eye. She hunted for Topic Sentences and Transitional Sentences the way little girls hunt for white violets in springtime. What she loved most of all were Figures of Speech. You remember her. You must have had her, too. Her influence will never die out of the land.

No, the book does not deal with the World, it deals with the world. There is the customary Thurber quota of dominating females and henpecked men, there is the doom-haunted man (whether the doom be Aaron Burr or just a whip-poor-will is immaterial). Many passages touch on man's tremendous capacity for self deception. His ironies are in many fires. Tech students will appreciate Della's bewildering remarks and her master's tolerant answers:

> "Where are you from, Mr. Thurl?" she asked me one day. I told her Ohio, and she said, "Ooooh, to be sure!" as if I had given her a clue to my crazy definitions, my insensitivity to the ordinary household nouns, and my ignorance of the commoner migratory birds. "Semantics, Ohio," I said. "Why, there's one of them in Massachusetts, too," said Della. "The one I mean," I told her, "is bigger and more confusing. "I'll bet it is," said Della.

Thurber has more than one style, too. His baseball story, "You Could Look It up", which appeared in the *Saturday Evening Post* accomplishes the amazing feat of being the most entertaining sports story ever to appear in that famous magazine, but also of being written with freshness of style, and with an irony which most people can easily miss. It is in itself an amusing story; it is also a baseball story to end all baseball stories, and it makes us wish for more—from Thurber. There is the crystal clear

style of his retelling of the famous murder of the twenties, The Halls-Mills Case. Or there is a magnificent bit of *Americana* (if it isn't true, it ought to be), the account of Thurber's greatgrandfather, Jake Fisher. Jake had a wide reputation for strength and fighting. When Jake was on his deathbed "the preacher called on him. 'Don't you want to forgive your enemies?' he asked. Jake smiled, 'I ain't got none,' he said. 'I licked 'em all.' "

There is the old—no, an increased —verbal dexterity, as in such a simile: "a comparatively peaceful sound, like two men trying to take a rug away from a bulldog." Or again, "To a male polar bear, female polar bears are as different as thumbprints to a G-man." Or his allusive wit, "Della came to our house in Connecticut some months ago, trailing her glory of cloudiness." But make your own collection, you'll have fun doing it.

In his account of Jake, Thurber wrote: "I tremble to think what he would have said of a great-grandson who turned out to be a writer." Jake might be puzzled; I think that he would be proud.

HOWARD P. VINCENT.

BIRD GUN TESTS PLANE WINDSHIELDS

With plane speeds increasing, the risk of a large bird crashing through the windshield and endangering the life of the pilot and all other aboard demands attention. Under the guidance of the Civil Aeronautics Administration, a cooperative scientific study of just what happens to the windshield of a plane when struck at high speed by a heavy bird, is being made by airplane operators, builders and suppliers. The purpose is to learn how to construct windshields that have greater strength against such impact. The study is being made, strangely enough, in a Westinghouse laboratory used primarily for testing circuit breakers.

The test equipment consists of a high-velocity compressed-air gun, designed and fabricated by engineers of the Westinghouse Engineering Laboratory. The gun which has two interchangeable barrels, one five inches, and the other ten inches in diameter—both 20 feet long, is connected to a reservoir of air under high pressure. Loaded with an electrocuted chicken or turkey the gun is fired at the test windshield. Velocities far above plane speeds now contemplated, can be achieved. ffl

Approximately a hundred tests have been made, using different speeds, angles of impact, sizes of birds, and types of windshields. Already Civil Aeronautics Association engineers have learned how to increase the impact resistance tremendously. A standard transport plane windshield broke when struck by a four-pound bird at a speed of 75 mph. The latest windshields tested withstood the impact of a four-pound bird at 300 mph., and of a 15-pound bird at over 200 mph.

A NEW SERVICE TO INDUSTRY

A National Registry of Rare Chemicals has been established at Armour Research Foundation as the newest phase of the Foundation's service to American science and industry. Martin H. Heeren, chairman of Chemical Engineering Research at the Foundation, has been appointed Director of the Registry.

The need for a centralized source of information on chemicals too rare to be listed in the catalogs of the regular chemical supply houses has long been recognized. Many unusual chemicals have been prepared from time to time in the country's laboratories, schools, and industrial plants, but their existence has not become generally known. In some instances these chemicals have been prepared for some highly specialized purpose, and their adaptability to other applications has not been thoroughly exploited. In other cases they have come into being as an incidental by-product of research, and have not been of direct interest to the worker who prepared them.

The same chemicals, however, may be of extreme interest to a research worker in some other field, provided he is aware of the fact that they can be obtained from an existing source. Such knowledge may spare him the duplication of effort necessary in preparing the chemical himself. It is possible, too, that his further investigations with the chemical may suggest fields of utility not recognized by the originator.

The establishment of the Registry will, for the first time, make available information on chemicals of this character. Data on such chemicals will be filed with the Registry, and will be indexed according to name, location, and quantities available. The Registry does not store, buy, or sell the actual chemicals, but merely maintains the indexed file of their sources and supplies. Chemicals which can be found in the catalogs of supply houses are not included, but all those not available through regular channels will be listed. The file will be regarded as confidential, and will not be open to general inspection. Inquiries on specific chemicals will be answered by the Registry.

It is the aim of the Registry to make the file as complete as possible. Listings of certain specialized chemicals which have already been compiled by private laboratories have been incorporated into the Registry files, including the results of the pioneer work undertaken by the American Association of Scientific Workers and directed toward the establishment of a central informational clearing house on chemicals.

In addition, requests for data have been made of approximately 2,000 industrial and educational laboratories. It is realized that these steps may by no means exhaust the possible sources of supply of rare chemicals, and sources which have not been contacted can assist in making the file more complete by voluntarily submitting information.

The establishment of the Registry is expected to have beneficial results in promoting the progress of chemical research, because of the assistance which it will offer the research worker in locating sources of supply of chemicals which he may urgently need.

—From The Frontier, June 1942

Since the above announcement in June, the National Registry has listed more than 4,000 chemicals. It has located more than seventy per cent of the 1200 chemicals wanted by 350 companies which have sent requests to the Registry and is still searching for the rest. All expense is borne by the Foundation.

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CONSERVATION OF CRITICAL MATERIALS BY THE USE OF ALTERNATES

By John Horn

The degree of fulfillment of the war production program depends in large measure upon industry's ability to find and adopt alternates for a major portion of materials which heretofore have been commonly available in ample quantities.

Coming, as it does, at a time when the call for production of tried, as well as of new, designs involves quantities of virtually unheard-of magnitudes, the problem represents a severe challenge to the engineering profession. The resultant complications are baffling but the two-fold job must be executed, and beyond doubt it will be done by the application of engineering ingenuity and wholehearted co-operation on the part of all members of the profession. This seems undisputable because what is more truly an engineer's task than an everlasting endeavor to devise ways and means of meeting new requirements?

For the purpose of this discussion it may be interesting to trace the procedure adopted in the General Electric Company with the aim of not only meeting the various requirements as laid down in the conservation orders of the WPB but even to go a step farther so as to serve the national interest to the very fullest extent.

Compliance Procedure

The procedure starts at the arrival of the conservation orders issued from time to time from Washington. As soon as the orders are received at the main office of the company they are reviewed by the general manufacturing department in collaboration with the central procurement and engineering departments. This review aims principally at interpreting the orders in the terms of the company at large. Accompanied by an interpretation of this nature the orders are immediately passed on to the heads of production and engineering in the administrative offices of the various plants. At this stage they become subject to a second review by these production and engineering representatives who determine the effect of the orders upon the operations of the particular plant and then arrange to pass the orders along to those departments that will be specifically affected. Here again, a production and engineering representative go over the order jointly and decide upon the action that will be necessary to comply with the terms of the order and also to go beyond that point wher-

(*Turn to page 52*)

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CONSERVATION

(From page 48)

ever it is feasible to do so in the interest of the general material situation in the country. In cases where the orders involve particular hardships which cannot be overcome immediately the departmental representatives proceed to prepare the appeals in accordance with the regulations of the order. These appeals pass back through the same channels through which the orders reach the individual departments. In the first instance the appeals are reviewed from the viewpoint of the common interest of the specific plant and in the second instance from the standpoint of the company as a whole. Whenever two or more departments or plants are affected by the order an attempt is made to co-ordinate the necessary appeal so as to present to the WPB a unified picture that will indicate the over-all needs of the company in respect to relief.

It may at first appear that the outlined procedure is a somewhat complicated one, but on closer analysis it will hardly be found much different from that followed by smaller individual concerns. It must be remembered, however, that the Apparatus Division of the General Electric Company, with which this review deals, is composed of departments which, in several instances, produce similar or parallel lines of apparatus that differ chiefly in size. With this situation it has proved equally necessary and desirable to add the co-ordinating effort that is provided for by going through several central points in handling both incoming regulations and outgoing appeals. Our experience has definitely indicated that it is essential both to us and to the WPB to handle the conservation orders and the matters connected therewith in a truly comprehensive fashion of this nature.

Conservation Effort

In the case of materials which are commonly used throughout the manufacturing units as a whole, the actual conservation effort is usually organized under the leadership of one or more specialists from the metallurgical staff, or under the guidance of one of the existing metallurgical and material committees, of which a dozen or more have been operating over a period of years as advisory and standardizing groups.

These individuals or committees survey the general situation as regards a particular material or as regards available alternate materials for the same, and in that survey collect all the available information with particular reference to characteristics, availability, and general application data. At the same time, tests and experiments are initiated wherever necessary to try out new or modified materials with special emphasis to their adaptability for

These eight horizontal pressure tanks are used to store volatile products at an Illinois natural gasoline plant. They were built by Chicago Bridge & Iron Company, hold 1,000 bbls. each and operate at 46 lbs. per sq. in. pressure.

employment in existing designs and for use with available manufacturing equipment. Also, the various departmental or plant representatives, the interested engineers, and the manufacturing personnel concerned, are contacted and arrangements are made for whatever local or specialized action may be required to reach the desired results as expeditiously as possible. As soon as the general survey is completed and the required basic information is obtained, the central co-ordinator arranges to go over local problems on location, to compare notes with his collaborators, and to promote decisions for those changes that hold the best promise from the viewpoints of procurement, manufacturing and engineering.

Then follows the initial introduction of the material selected in the described process and this sometimes requires execution on a trial basis to gain actual usage experience before a complete switchover is made.

Classes of Conservation

In general, conservation may be resolved into several distinct classes along the following lines:

1. Conservation by straight substitution involving a direct change from one material to another without any significant modifications in design or in application. A simple example would be a change from cast tin-base to tin-free bronze, or also from primary to secondary aluminum. In either of these instances, the attainable characteristics and properties of the alternate material may be sufficiently close to those of the original material so that a part or product of the latter may be replaced directly with its equivalent produced from the alternate material without any changes in manufacturing except perhaps for some modification in the casting procedure.

2. A second class of conservation can be visualized to involve a reduction in the quantity of material used. The problem here is often largely one of finding new ways of using and fabricating the material in question. Take the case of tin-base babbitt where a substantial reduction in tin can be achieved by changing to thin-walled babbitt designs. Also in this particular instance the principal difference between the use of new and old constructions may lie in a change of casting technique. Another example of the same class may involve the use of the same material as before, but to do this from the viewpoint of material scarcity rather than from the standpoint of ease and economy of manufacture. Parts manufactured from sheet material may fall within this group and the question may resolve itself into a different laying out of the pieces possibly with resort to welding of multiple pieces into the final shape.

3. A third class of conservation may take in the change to alternates with a consequent need for changes in design and most likely also in manufacturing. An obvious example of this character would be a change from aluminum to steel construction. If this concerns a sizeable assembly, a complete redesigning job is apt to be involved and besides, an extensive change in manufacturing, both in method and equipment, will usually be required. This type of conservation therefore commonly represents an undertaking of such a scope that the time and effort required for its execution all the way from the designing board down to factory floor, may be of almost alarming proportions. At the present time with its critical material situation there may nevertheless be no other choice but to proceed with the sought conservation even at the expense of a considerable tying-up of man-hours and equipment that could otherwise be used to good advantage for other work.

There are, of course, other ways in may be grouped but the foregoing classification broadly covers the most common situations that have arisen in G-E organization.

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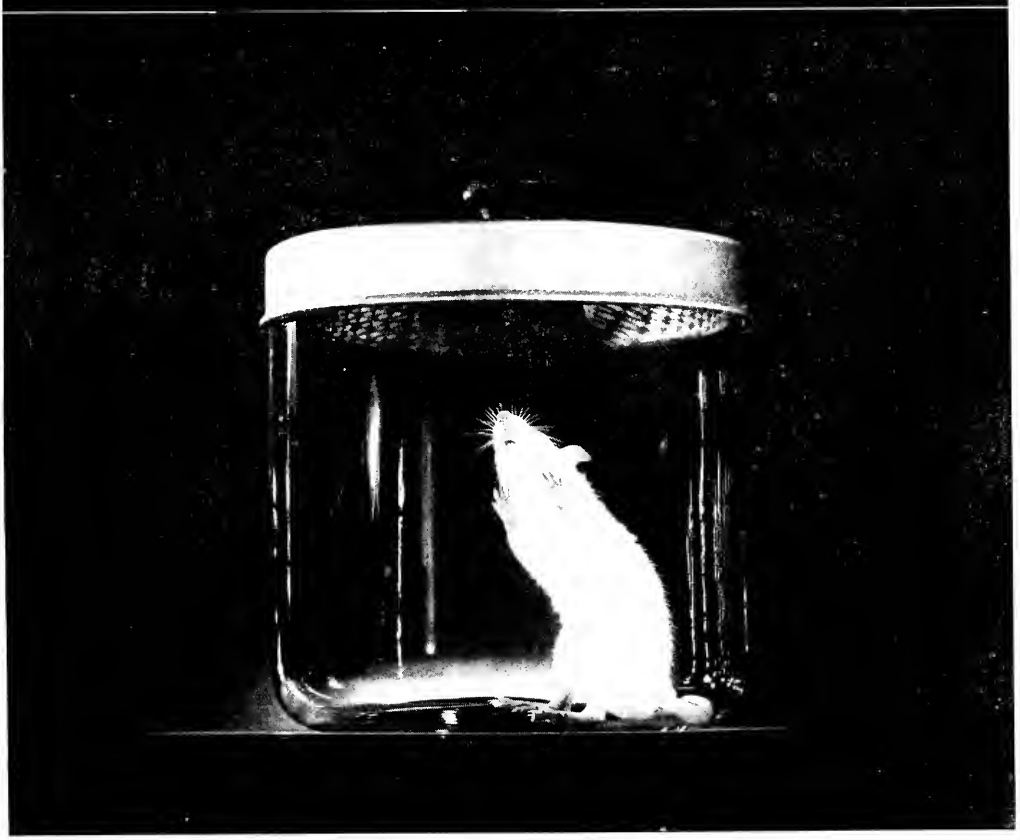
The rat that went to college...



CHARLEY, the large and healthy white rat shown above, not only goes to college but he lives in a glass house!

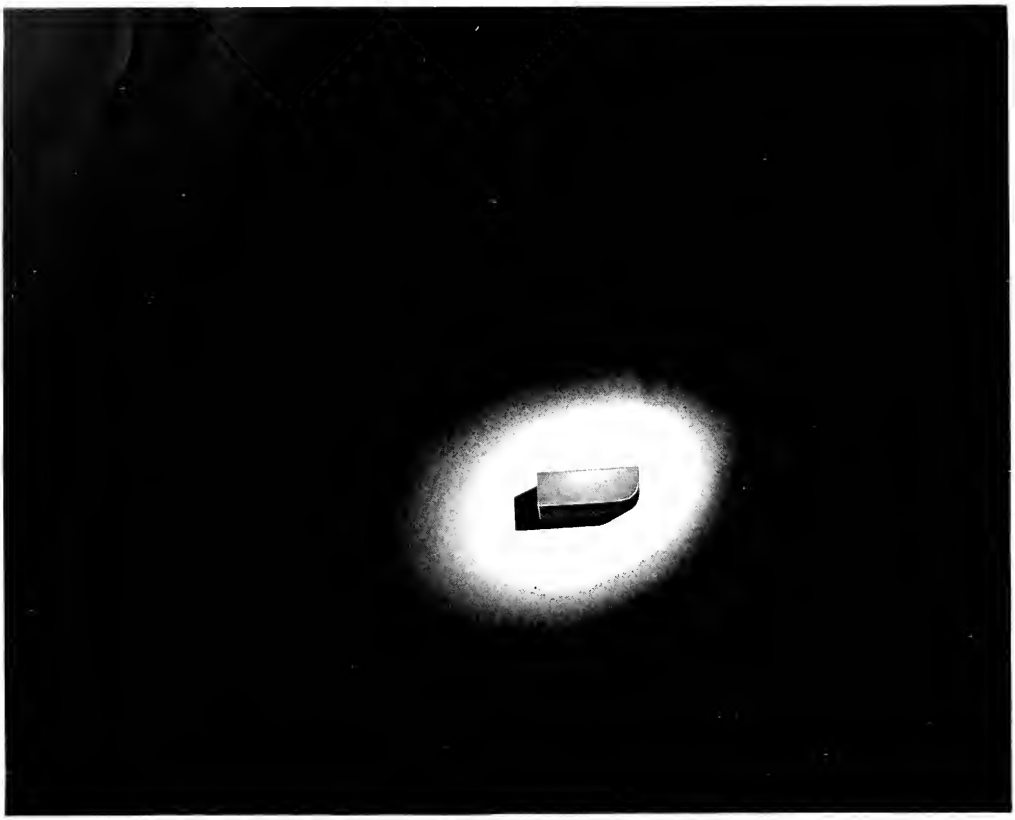
For Charley is one of the thousands of white rats used for scientific research in American college laboratories. His glass house is a Pyrex animal jar, for a couple of good reasons: One, because of its exceptional mechanical strength. Two, because Pyrex glass can be sterilized in live steam without breaking or becoming cloudy, which makes it a favorite with laboratory men.

Pyrex laboratory ware, developed during the last war to replace imported glass, is just one of Corning's many research contributions to better living. Others are everywhere. The glass tubes in your radio. Beacons that guide American planes. Glass pumps and piping in busy chemical and food plants. Signal lights and insulators on our warships.

Corning knows glass. Knows how to make it resistant to chemicals and heat, strong and hard to withstand impact and abrasion, accurate to tolerances ranging as low as 0.00002 of an inch.

This knowledge is being put to good use today. A special sanitary glass piping, for example, has just been developed to ease the dairy industry's shortage of metal. The communications industry, faced with a sudden wartime demand for insulators in intricate shapes and with special electrical characteristics, is using glass insulators quickly developed by Corning. Design engineers who are licking this war's problems are finding ever new uses for glass. For tomorrow's engineers also, glass is the material with unlimited possibilities. Industrial Division, Corning Glass Works, Corning, New York.

CORNING
means
Research in Glass



"METALLIC VITAMINS" FOR INDUSTRY

So effective are relatively minute quantities of cemented carbides in stepping up—pepping up—production that they are often called the "metallic vitamins" of industry.

Because only small quantities are required per tool, Carboloy cemented carbides are measured in grams. A gram is 1/453rd part of a pound. A Carboloy tool tip weighing only 25 grams or slightly less than one *ounce* is a good size tip—enough to last for days, weeks—often months of cutting at speeds often higher than 4 to 5 times that possible with ordinary steel tools.

In terms of production, an ounce of cemented carbide can turn the turrets of dozens of tanks, or drill hundreds of guns, or turn as many as several hundred shell, or bore the cylinders of hundreds of "Jeep" cars. One ounce of carbide can do these and countless other crucial machining jobs faster and better than any other tool material.

These "metallic vitamins" also serve the cause of victory in many other ways. In masonry drills, they drill holes in concrete 75% faster for installing war production machinery. . . . In dies they speed up production of wire, cartridge cases, bullets, etc. . . . As wear-resistant inserts on vital machine parts, they keep machines running. As a matrix material, they conserve diamonds, shorten operating time on mine drilling, dressing of grinding wheels, etc.

The myriad of present uses for Carboloy—the "metallic vitamin" of industry—now helping to speed the day of victory, forecast the steadily increasing diversity of benefits for the years of peace to come. ★ ★ Carboloy Company, Inc., Detroit, Mich. District Offices: Birmingham, Ala. • Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Seattle.

CARBOLOY TRAINING FILMS

A series of six Carboloy Training Films now available covering detailed, step-by-step procedure on the design, brazing, grinding, use and manufacture of cemented carbide tools, 35 mm silent slide films. (Not motion pictures.) Available for permanent use at approximate print cost of $20 per set. Educational institutions may also secure sets on loan for single showings through selected college film loan libraries. Catalog and loan library listing on request. Write Carboloy Company Inc., Detroit, for Booklet "A".

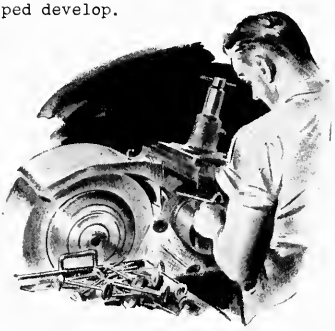
CARBOLOY
TRADEMARK

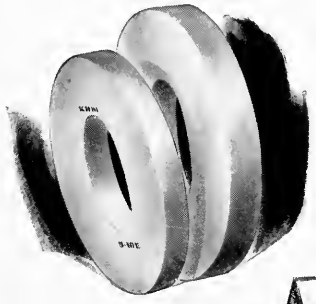
CEMENTED CARBIDE
TOOLS • DIES • DRESSERS
MASONRY DRILLS • WEAR PARTS

What's the hottest spot in a Dog Fight ?

A pilot may keep cool in a "dog fight"—but not his engine! And to function smoothly at high engine temperatures all moving parts must be ground and finished with split hair precision. And that's where Carborundum comes in. For instance, the valve stems are ground to the required accuracy by a centerless grinding process which Carborundum helped develop.

The centerless grinder grinds the valve stems to an accuracy of five ten-thousandths of an inch. Does it, too, in half the time other finishing methods would require. Carborundum has led in the development of centerless grinding wheels to speed the output of valves, pistons, shafts and other such parts that go into a plane.





Industry at war is finding new uses for grinding wheels and other abrasive products...Weapons for Production...every day. When you get in the field and encounter a production problem which abrasives might solve, write The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

A DEPRESSION STRATEGY BECOMES A WAR ASSET

We did not envision war during the depression years when we planned and built a series of giant coal refineries. It was our objective to create a better product economically — to help improve and keep secure the good will by which our business lives.

Operating now are six such refineries. With machine-precision they extract non-combustibles from Peabody coal before it is loaded for shipment. These non-combustibles are refined from the coal at a daily rate totaling hundreds of tons — saving the use of railroad equipment for its transport — saving again the use of manpower to handle it from the mines to final disposal in the form of worthless ash.

In its clear contribution to the conservation so vital to today's needs, this peacetime development has in reality become a war asset.

PEABODY COAL COMPANY

231 South La Salle Street, Chicago, Illinois

BRANCHES: NEW YORK - ST. LOUIS - MINNEAPOLIS - CINCINNATI - OMAHA - SPRINGFIELD

Your future is not forgotten

★ A MESSAGE TO MEN IN COLLEGE

There will be a future.

The very service you are being called upon to render to your country is assurance of that. We know the stuff you're made of, because we have watched two generations of college men join our ranks and grow with us.

And the materiel which we older men in industry are pouring out makes assurance doubly sure.

What kind of future will you have?

By chapter and verse, no one can recite *exactly*. But a lot of folks like us mean to see that Opportunity is going to be greater than any generation of young men has ever known.

Every hour of thinking time we can catch on the fly is devoted to that one aim. Here at Alcoa we call it Imagineering. We are letting our imagination soar, and ballasting it with engineering experience. Our purpose is to make aluminum make jobs where none ever existed before.

The exciting new uses we glimpse for Alcoa Aluminum are our part of the groundwork of the structure of peace you will come back to help to build.

Your chance is going to be the creative chance. The materials, the tools, the techniques, will be ready and waiting. Your imagination, your ingenuity, your courage to do, cannot, must not, fail to have their turn.

As man to man we say it, soberly: Your future is not forgotten.

A PARENTHETICAL ASIDE: FROM THE AUTOBIOGRAPHY OF

ALCOA ALUMINUM

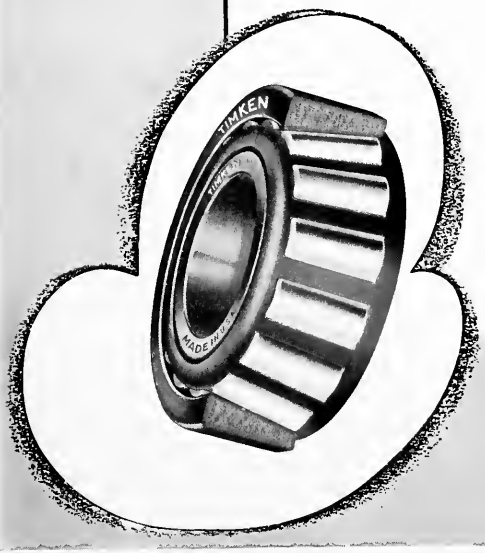
• This message is printed by Aluminum Company of America to help people to understand *what we do* and *what sort of men* make aluminum grow in usefulness.

Engineers who know their bearings are helping to win the war. Take a tip from them for your future's sake.

No matter how well a machine is designed in other respects it cannot operate with maximum efficiency if its bearings are unequal to the tasks assigned to them.

For example, friction elimination is only one function of bearings in modern mechanical equipment. Equally imperative and important are ability to carry and control radial loads, thrust loads and any combination of them; to hold moving parts in correct and constant alignment; and to adapt themselves to any condition of application without the slightest reduction of efficiency in any respect.

Timken Tapered Roller Bearings have a success record covering more than 44 years and embracing every kind of equipment used in industry and transportation as well as modern weapons of war, including tanks, trucks, armored cars, guns, airplanes and warships.



With a thorough knowledge of Timken Bearings at your command you never will be confronted with a bearing problem you cannot solve. Begin to acquire this knowledge now. Timken Bearing specialists will be glad to assist you. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN
TAPERED ROLLER BEARINGS

"All there is in Bearings"

When you're doing a bang-up job you want a bang-up smoke and for anybody's money you can't buy a better cigarette than Chesterfield.

Try them yourself...you'll find Chesterfields as Mild and Cool as the day is long...and Better-Tasting, too.

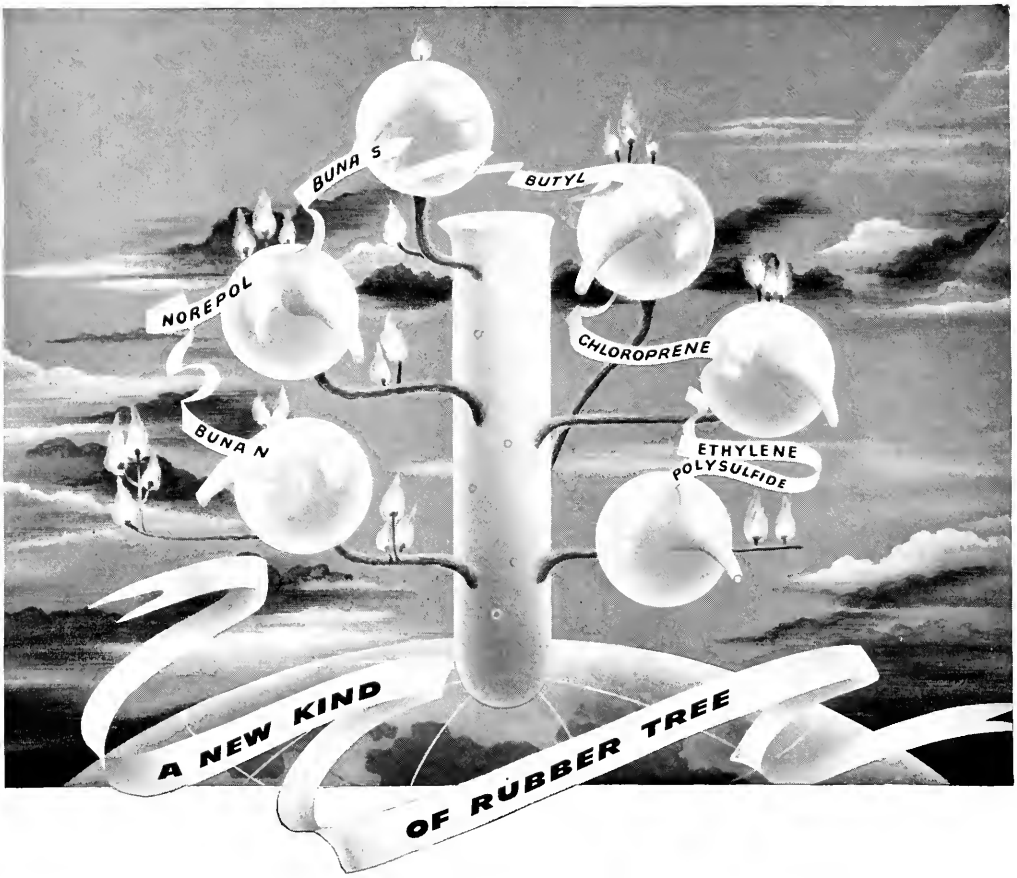
WHERE A CIGARETTE COUNTS MOST

It's Chesterfield

ILLINOIS TECH ENGINEER

AND ALUMNUS

MAY, 1943



Going Nature one better, the chemist has produced a rubber tree that is infinitely more fruitful than Nature's, for from its branches come many different types of rubber.

Yet this is merely the spadework in the proposed synthetic rubber program that far outdistances natural rubber's heyday in its scope of application. In order to meet the soaring demand and to equip the various synthetics with all the necessary properties—new compounding ingredients and refined processing techniques must be developed *continually.*

You have already seen these synthetics adapted, one by one, to virtually all of natural rubber's former applications—Buna S for tires and the insulation of wire... Butyl for self-sealing gas tanks in bombers and fighter planes... Chloroprene for heavy-duty tires, hose and cable jacks.

From the very beginning, Wishnick-Tumpeer, Inc. has been constantly active—seeking ways to increase the efficiency of these new *raw materials.* Drawing on the experience of many years of service to rubber manufacturers, Witco Research Laboratories have worked closely with the industry in solving such fundamental problems as pigmentation in compounding and vulcanizing synthetics into tires and rubber specialties.

Among the processing materials already supplied to speed the production and improve the quality of "chemical" rubber are Witco products which increase heat resistance in tire treads, improve tensile and tear resistance, and save milling time. If you are experimenting with synthetic rubber, or considering adapting it to various uses, why not take advantage of the laboratory and technical assistance offered by Wishnick-Tumpeer.

WISHNICK-TUMPEER, INC.

MANUFACTURERS AND EXPORTERS

New York, 295 Madison Avenue • Boston, 141 Milk Street • Chicago, Tribune Tower • Cleveland, 616 St. Clair Avenue, N. E. • Witco Affiliates: The Pioneer Asphalt Company • Panhandle Carbon Company
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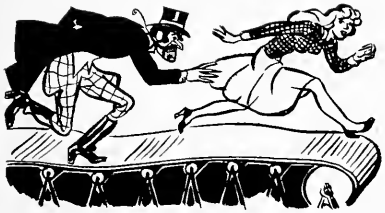
WITCO

G-E Campus News

RESEARCH AND ENGINEERING KEEP GENERAL ELECTRIC YEARS AHEAD

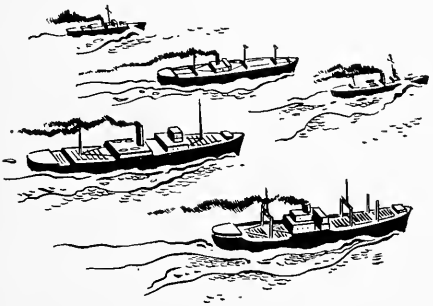


FOILED!

WHEN in a movie "the villain pursues and pursues her," he's not really getting anywhere at all.

To keep the players within camera range while they are constantly on the move—going nowhere—the Metro-Goldwyn-Mayer studios are now using a sound-insulated treadmill, powered by General Electric.

An even motion was required through all the action shots, from a slow walk to a race. Now, in 30 seconds, the treadmill can be accelerated smoothly from zero to full speed in either direction, by means of a G-E motor-generator set.



LEND-LEASE IN REVERSE

USUALLY we think of the United States as the arsenal and machine shop of democracy, but actually the Atlantic is a two-way ocean. And General Electric recently announced that since early in 1942 the Company has been using five giant English metal-working machines in the production of vital ship-propulsion equipment.

The machines were sent from England in separate ships on different dates, to forestall their destruction by German submarines. One of the ships was attacked during the crossing and was damaged but made its American port safely.

The arrival of the machines was really *two* strikes against the Nazis, for had they remained over there they might not now be producing for the United Nations. One of them had been installed in a plant in Sheffield, and another was destined to go there—and that city was later bombed by the Axis.

"PAPER DOLLS"

RIGHT out of the kindergarten is the latest metal-saving technique in General Electric. Many thousands of complexly designed parts are required for intricate electric apparatus—and all must be cut from flat sections of scarce metals.

So, just like patterns for paper dolls, the planners draw the parts to scale on paper, cut them out, and shift them around till they mesh together in a manner very similar to a jigsaw puzzle.

Frequently it is possible to redesign the parts when it is found that slight changes in the length, width, or thickness will allow more parts to be cut from the same layout.

Photographs of this technique may be obtained free by writing Campus News, General Electric Company, Schenectady, N. Y.

Listen to the "Hour of Charm" at 10:00 p. m. EWT, Sundays, on the NBC network, and the G-E news program with Frazier Hunt at 6:00 p. m. EWT, Tuesdays, Thursdays, and Saturdays on the CBS and American (FM) networks.

GENERAL ELECTRIC

963-60-211

Official U. S. Navy Photograph

TEAMWORK is Imperative in a Gun Crew.

TEAMWORK is Imperative in the War Effort. Every Move, Every Moment Counts. Our Men, Our Machines, Our Dollars, Teamed Together

Bring VICTORY Nearer.

This space is a contribution to America's all-out war effort by

ECONOMY FUSE AND MANUFACTURING COMPANY

General Offices — Greenview at Diversey Parkway — CHICAGO, ILLINOIS, U. S. A.

Ability to produce for ourselves and our allies is completely dependent on the generation of power—the energy that turns the wheels of industry. The common enemy of power is water-deposited scale. It must be removed, if boilers are to deliver their full quota of B.T.U.'s. The conventional practice for scale removal is a manual operation consuming much time. Chemistry has stepped in and now provides an efficient method that removes the scale in a few hours.

This is an industrial service developed by Dowell Incorporated, subsidiary of The Dow Chemical Company, with eleven years' experience in the chemical treatment of oil and gas wells. Dowell service uses chemical solutions for the disintegration and removal of deposits coating heat exchange surfaces. Precious time, manpower, equipment are saved. Thus chemistry is assisting industry in maintaining its "balance of power."

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York—St. Louis—Chicago—Houston—San Francisco—Los Angeles—Seattle

DOWELL

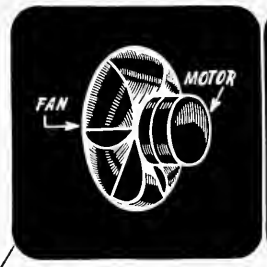
Dow

CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

THE

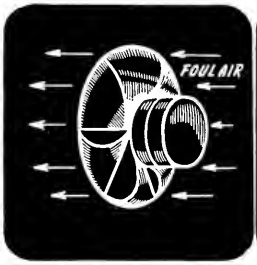
Inside Story

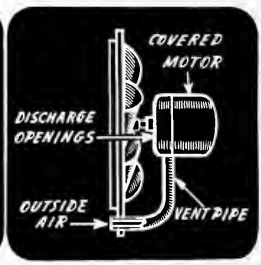
OF VENTILATING FANS



1 Propeller fan, in simplest terms, consists of motor and fan wheel. Low cost (no ducts), effective method of exhausting bad air, heat, steam, dust, vapors.

2 Direct connection of motor and wheel avoids noisy operation, misalignment, wasteful friction losses usually present when belts, gears, pulleys, or couplings are used.





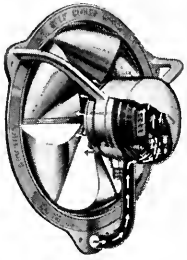
3 Motor comes into contact with impurities being exhausted. Grease, dust, steam, moisture, smoke, gases, or fumes in exhaust air deposit on motor.

4 If motor is *open,* deposits "gum-up" operation, interrupt service, shorten its life. If motor is *enclosed,* deposits form a blanket of insulation... motor "runs hot."

5 Recognizing this situation... Ilg did something about it... 35 years ago! As first step, Ilg built its own motor, specially designed for fan operation ... then *covered* it.

6 Vent pipe attached to motor cover has entrance to vent OUTSIDE of building, OUTSIDE of exhaust air stream. Air forced through fan blades creates suction at openings in FRONT of motor.

7 Suction at front motor openings draws air up through vent pipe, where it is circulated around motor, then is exhausted into air stream. Motor stays clean, cools itself!



Recognizing conditions under which exhaust fans operate, Ilg Self-Cooled Motor Propeller Fans have been engineered and constructed to operate at *peak efficiency* under those conditions! Place this "Inside Story" in your files ... call upon Ilg to help you solve your next ventilating fan problem!

Free Booklet!

Handy, condensed catalog of entire Ilg line. For your copy, clip coupon today!

ILG

ARMY E NAVY

VITALIZED VENTILATION

AND AIR CONDITIONING

AIR CHANGE... NOT JUST AIR MOVEMENT!

ILG ELECTRIC VENTILATING COMPANY
2890 NORTH CRAWFORD AVE., CHICAGO, ILLINOIS
OFFICES IN 39 PRINCIPAL CITIES

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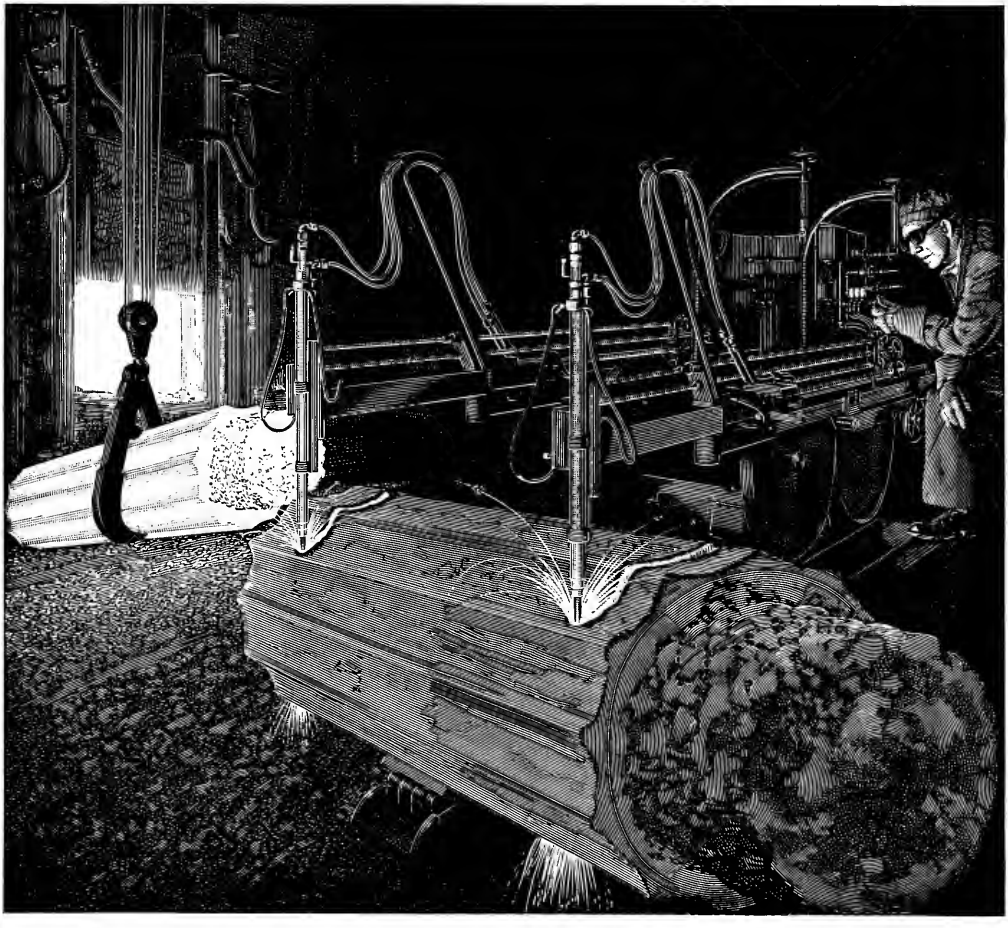

A quick trim for a metal giant

MAMMOTH ingots of steel for war weapons must be "cropped" or trimmed at the ends before forging. Formerly this job was done slowly and laboriously on a heavy press, but today the huge ingots are sliced neatly and quickly by the oxyacetylene flame.

Using a new heavy cutting technique developed by Airco Research Engineers and cutting through metal as thick as 36", the oxyacetylene flame trims off both ends of this ingot at once in approximately 11 minutes, compared to several hours required by other methods. The new ingot cutting machine designed and built by Airco engineers especially for this job guides the movement of the oxyacetylene cutting torches in an arc corresponding to the ingot contour.

This new flame cutting application typifies the ever-expanding usefulness of the oxyacetylene flame in American industry. Spurred by the need for swifter war production, industries are finding more and more ways to accelerate manufacturing with oxyacetylene flame and electric arc processes.

If you want to keep posted on some of the most recent developments and applications of oxyacetylene flame and electric arc processes, write for a free copy of the illustrated booklet, "Airco in the News." Please address your requests to Air Reduction, Room 1656, 60 East 42nd Street, New York.

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ANYTHING AND EVERYTHING FOR GAS WELDING OR CUTTING AND ARC WELDING

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The cover picture shows acres of Beechcraft advanced training planes at the plant of the Beech Aircraft Corporation.

ILLINOIS TECH ENGINEER AND ALUMNUS

MAY 1943

VOLUME 8 NUMBER 4

IN THIS ISSUE

Published in October, December, March, and May. Subscription rate $1.50 per year. Editorial and Business Office, Armour College of Engineering of Illinois Institute of Technology, 3300 Federal Street, Chicago, Illinois.

RESEARCH COMES TO THE PAMPA

By
FRANCIS GODWIN

There is a saying around the laboratories of the Armour Research Foundation that there is never a dull moment. After having been asked to redesign fountain pens, measure the racket and vibration of drop forge hammers, take a photographic portrait of a passing bullet, send a man to the South Pole, record the noise level throughout the city of Chicago, maintain an artificial South Pacific island in Ogden Field in the dead of winter and duplicate a stratosphere parachute jump on the second floor of the main laboratory building, project Number 1-143 seemed to offer no surprises. All that this required was an industrial and economic survey of the Republic of Argentina.

Argentina, occupying most of the lower end of the Continent of South America, stretches from the tropics to a point just outside the Antarctic Circle. Its western edge is formed by the backbone of the towering Andes, and from these mountains eastward stretches a vast alluvial plain. The country took its name from the one time prevalent but mistaken idea that it was a land of silver, but from the earliest days of its history as a colony of Spain, it has been an agricultural land, producing ever increasing amounts of grains, beef, mutton, hides and wool.

These agricultural products Argentina has traditionally exported for sale abroad, for although the country has fully a third of the area of the Continental United States, its population even today is less than a tenth of ours. To meet the local demand for manufactured products of all kinds, Argentina has used the exchange from the sale of these agricultural commodities to buy her machinery, chemicals, steel, automobiles and almost everything in the markets abroad.

Realizing that only by development of a reasonable number of national industries could the country release itself from absolute dependence upon foreign sources and shipping conditions, the Argentine government has in recent years commenced a program of industrialization, attempting to encourage the growth of national industries, as well as the exploration and use of her natural resources heretofore unexploited. It was to this end that the Corporación para la Promoción del Intercambio, a semi-governmental organization established to promote inter-American trade, at the beginning of 1942 commissioned the Armour Research Foundation to survey the entire country from the points of view of industry, technology, and economics. The purposes of this survey were not only to uncover Argentine commodities needed at this time in the United States, but to indicate the most profit-

able ways in which our technology could be applied to local industries, and the ways in which scientific research could be directed toward the improvement of Argentine products and raw materials to render them acceptable in the export market.

Following a preliminary statistical study conducted in the Chicago laboratories, the Foundation sent to Argentina a field party in which engineering, agricultural chemistry, and economics were represented. Our party made a rapid trip by Pan-American Airways to Buenos Aires, where it immediately set up field headquarters in connection with the offices of the Corporación para la Promoción del Intercambio in that city, and was reinforced by additional native help for the gathering and tabulation of information.

At field headquarters we gathered all available data on roads, railroads, airlines, river boat transportation and communication lines, and further supplemented our information on the geography of the country. With these aids, the Republic was then organized into zones for individual detailed study. Itineraries were laid out painstakingly for the extensive traveling that was to ensue. A great attention to detail was necessary in this, for several reasons. For one thing, it was essential that food, lodging, gasoline, and supplementary transportation be available where needed. Furthermore we could not afford to lose valuable time. Then too, we thought it would be nice to avoid losing ourselves.

There are many maps and charts of information to be found in Argentina. The best of them show towns where they really are, but there are sometimes a number of schools of thought in such matters. The relative sizes of type on some maps may or may not bear any relation to the importance of the towns. Our party settled these questions in a fair and impartial manner, taking the average of all opinions. On the matter of roads this was still not enough.

Argentine roads are undergoing gradual improvement. Many miles of new pavement are being laid. The agencies planning these developments have their road building programs laid out for many years into the future, with maps showing the projected locations of main paved highways, new feeder roads, and the existing routes with which they are to connect. Some of these maps may have become mixed in with the older ones at one time or another before going to the printer. The plans foretell a wonderful system of highways when completed; meanwhile it is helpful to make systematic inquiries before starting a trip by automobile. The local automobile club is very cooperative, sending to Buenos Aires regular reports telling which roads are navigable and which are filled hub-deep with adhesive mud in the outlying areas. As soon as a new road condition develops such reports are telegraphed to the city where they are carefully studied, printed and finally mailed back to the affected zones so that they can be available to the inquiring motorists not more than two or three days later. In addition to this service, most motorists venturing off the paved arteries carry a shovel.

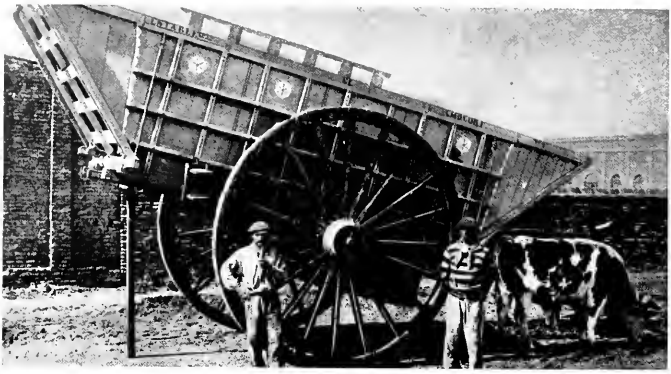
Once these preliminaries were completed, our travelling began and continued throughout almost a year in the course of which the party travelled about 25,000 miles into virtually every nook and corner of the Republic. By far the largest part of the travelling was done by automobile, well-known popular-priced cars being rented either in Buenos Aires or in outlying provinces. Sometimes, however, it was necessary to use river boats, local airlines, parts of the railroad system, and even horse and buggy.

The population of Argentina is approximately 13,000,000. Much of this is concentrated in the general region of Buenos Aires, the metropolitan area alone accounting for almost 3,000,000. Industrial activity is similarly distributed, with several supplementary industrial areas throughout the central portion of the country, especially at Rosario, Santa Fé, and Cordoba. Railroad lines and other transportation and communication systems have been laid out fan-wise from Buenos Aires. It is not unnatural, therefore, that the first areas selected for study lay in the central zone.

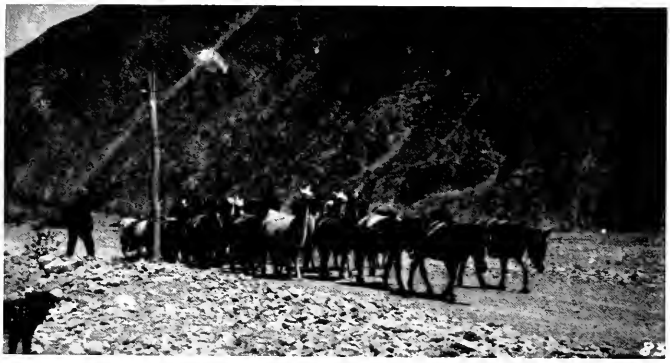
The first organized trip took the party up the Paraná River to the Province of Santa Fé. Considerable publicity dealing with the Armour group and its purpose heralded its arrival in the principal centers of that province. The field party was met with warm welcome, Rotary Club luncheons, and speeches in both English and Spanish. The cities were indeed perfect hosts. This fact in itself introduced some immediate complications. For one thing, a number of the organizations were so enthusiastic in entertaining the survey crew that it is feared they departed from their ordinary daily practice, so that in some cases it was a little difficult to study normal operation of the industrial plants. For another thing, Argentine luncheons are beautiful things to behold, and when accompanied by speeches, are apt to last quite a few hours, leaving not too much time for the real business of the mission. It was with considerable regret that the party found it advisable to curtail most of these interesting meetings and to proceed in its travels with a minimum of advance notice.

The ancient church-filled industrial city of Cordoba was descended upon without warning, in the middle of an automobile journey which crossed

Community Park in Salta.



Argentine bullock cart for muddy roads.



Llamas and burros in the Humahuaca region.

Ancient rock inscriptions in La Rioja.

Santa Fe and the important wheat zone surrounding San Francisco. Without announcing its program, day after day at Cordoba the party went forth from the hotel and inspected factories, schools, farms and related activities. Luncheons were taken with industrialists and provided time for valuable conferences. Other men were interviewed at cocktail time—between six and eight in the evening—and still others at dinner from nine to eleven. From the point of view of information gathered in a minimum of time this new technique proved successful. Later, completing the Cordoba circuit, the itinerary zigzagged southward through the province to cover each principal zone, finally striking an easterly course back to Buenos Aires. In a period of less than three weeks this circuit accomplished more than fifty detailed inspections and provided a pattern for future journeys.

Six major field journeys covered most of the Republic, omitting only certain areas which were known to be nearly devoid of human beings, not to mention industries. Following the Santa Fé and Cordoba trips, our group flew 600 miles to the Chaco in a multimotored flying boat piloted by a native whose apparent interest in the flora and fauna of the countryside prompted him to skim the treetops with inches to spare. Landing in the Paraná River we proceeded to the town of Resistencia where we immediately found that our advance arrangements for an automobile had not been carried out. Such things only added to the interest of the travel, however, and we were able to secure a prehistoric sedan together with a driver whose faith in worn-out machinery surpassed ours. With this combination we drove a full week at breakneck speed with only a few stops for repairs, reached the innermost parts of the Chaco, and finally succeeded in getting back to the Paraná River for the journey into the Misiones jungle.

The log entry for July 23 reads in part: "Started the day by going down to the river steamer office for tickets on the Posadas boat. Our guide had phoned for reservations earlier, mentioning that he had several influential friends in the company. Accordingly we were received graciously by the local manager and spent about an hour in his private office discussing our plans. In the end we were invited to step over to the general ticket window and buy our tickets. It was indeed fortunate that we had come with such good connections and influence, as otherwise we might have been forced

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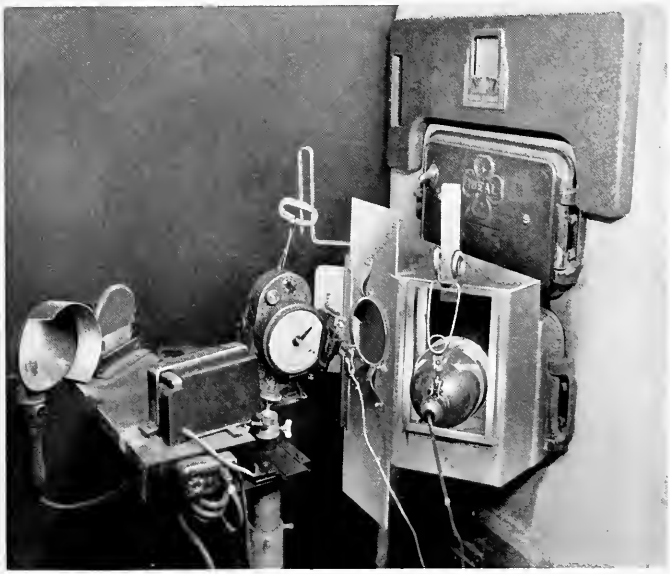
DOMESTIC UNDERFEED STOKERS

By
WALTER KNOX and C. H. SAWYER

The use of coal stokers has increased tremendously in the last five years. Approximately 200,000 units were sold in 1941 (the last year of unrestricted production), and by January, 1943, a total of 1,000,000 installations had been made.[1] Mass production has definitely been achieved, and manufacture has reached big business proportions with a dollar volume of seven figures for some producers.

The above figures include all types of stokers feeding up to 1200 lb. of coal per hour. Most of them have been underfeed stokers, and during the last few years ninety percent of the stoker sales have been of the small sizes such as go in individual homes. Roughly ninety percent of all installations have been bituminous stokers of the clinker type, while most of the remainder have been anthracite stokers of the ash removal type. Relatively few ash removal bituminous stokers have been marketed, although more research is being directed along that line at the present time.

Along with the increase in the use of stokers there has been a corresponding increase in the production of good stoker coal. This has resulted in large investments in machinery for its preparation; that is, equipment for handling, washing, sizing, and de-dusting. At the present time about 30,000,000 tons of stoker coal are produced each year.[2]



Camera and special boiler door for taking movies.

If we restrict ourselves to the small household bituminous stokers, which make up the bulk of the sales, and examine the reasons for their popularity, we will see, first, that they perform a service. They do this by relieving the home owner of drudgery and by automatically heating his home better than ever before. Stokers burn bituminous coal with practically no smoke and with a minimum of attention. In general, stoker firing is more economical than hand firing because of greater burning efficiency and because in the past stoker coals have been cheaper than hand firing sizes. Stoker coals are still somewhat cheaper, but economy is no longer a primary consideration.

Originally, stokers were advertised as adaptable to cheap, low quality coals. However, stoker manufacturers now stress such factors as comfort and convenience. In order to obtain the maximum of such benefits stoker users are turning more and more to the use of high heat, low ash, low volatile coals. More than 2,000,000 tons of premium low volatile coals are used annually in small stokers.

An underfeed bituminous stoker is a simple machine which puts coal up through a retort onto a refractory hearth (cast iron hearths in large machines), and burns the coal by forced draft from a fan. Operation is regulated by a thermostat if the installation is in the home. Other primary electrical controls are generally used in commercial installations. The ash in the coal is removed from the hearth in the form of clinkers.

The home owner finds the stoker easy to operate since the things he has to know about his purchase are few and easy to understand. Moreover, excellent heating is obtained without critical adjustment. For example, the University of Illinois[3] found in their Warm Air Research Residence that, in a house requiring thirteen pounds of coal per hour to offset the maximum heat loss, coal feed settings as widely divergent as forty-eight pounds and twenty-six pounds per hour gave satisfactory results, the stoker simply operating for

less time at the higher feed rate. Adjustment of coal feed rates, stack draft, and forced air supply, do of course affect efficiency and other factors, but there is a wide range of settings within which comfort, convenience, and trouble-free operation are obtained.

Another important factor in the expanding sale of underfeed bituminous stokers is their adaptability. They are used in practically every sort of boiler, furnace, and heating plant, and are burning a wide variety of coals, including semi-bituminous lignite. Installations may be made in round, square or rectangular boilers and furnaces. Electrical controls are available to regulate every sort of heating system. The coals used vary in analysis from three percent to fifteen percent ash, from 1900° F. to 2700° ash softening temperatures, and from sixteen percent to forty percent and more in volatile matter. Naturally, some coals give better results than others. A low ash content means less clinker to remove; fairly low-fusing ash is generally best for small stokers, and high-fusing ash is more adaptable to large machines; low-volatile coals give less soot and greater efficiency. Not all coals will work, but the number that give satisfaction is large and varied as to analysis, so that bituminous stokers are common in practically every section of the country except where gas and fuel oil are extremely cheap.

Another factor responsible for the present vogue of bituminous stokers is mechanical simplicity. Because of this they lend themselves to production at a cost that invites purchase, and they can be built sufficiently rugged to stand up under hard usage. There are few moving parts, involved

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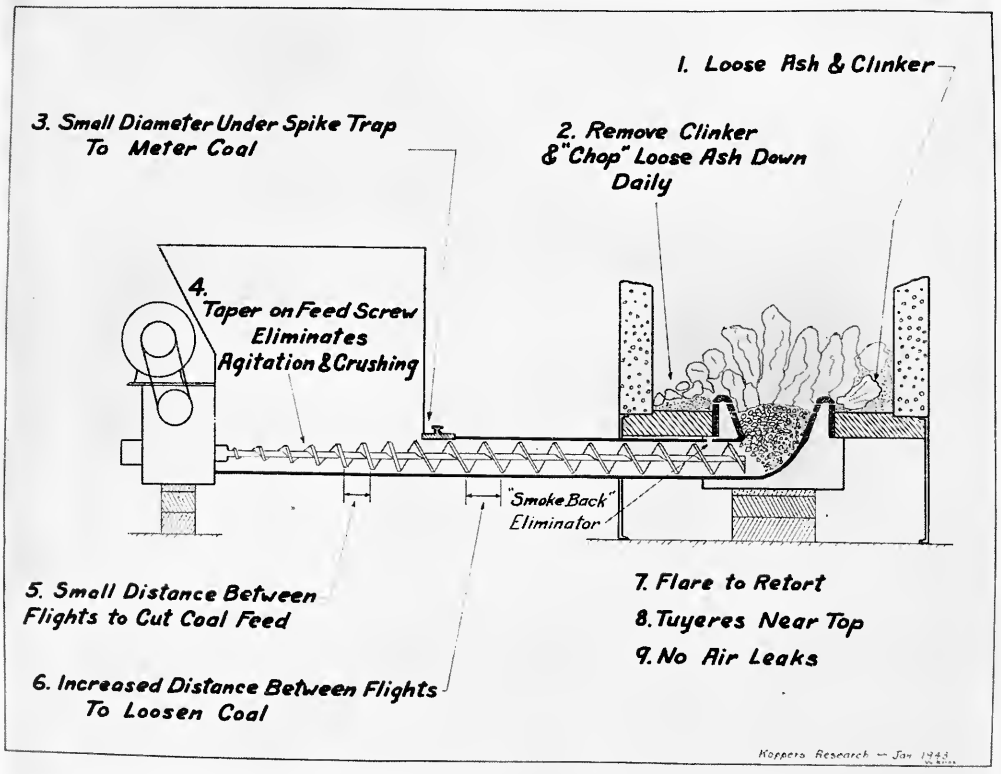
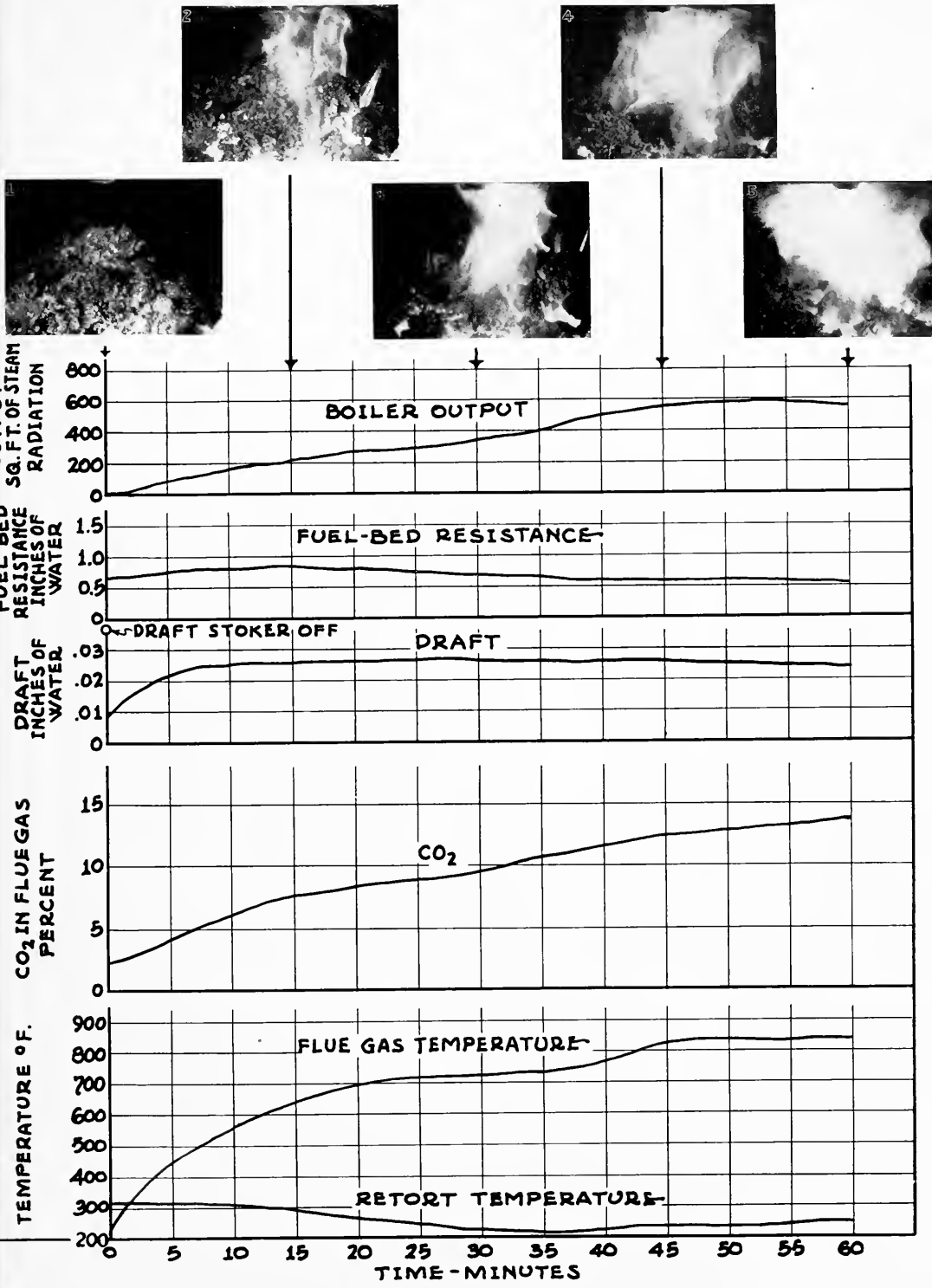
Opposite page: Changing conditions as a stoker fire goes from no load to full load.

Below: Some features of design and installation of small bituminous stokers.




2
4
1
3
5
OUTPUT SQ. FT. OF STEAM RADIATION
800
600
400
200
0
BOILER OUTPUT
FUEL BED RESISTANCE INCHES OF WATER
1.5
1.0
0.5
0
FUEL-BED RESISTANCE
DRAFT INCHES OF WATER
DRAFT STOKER OFF
DRAFT
.03
.02
.01
0
CO2 IN FLUE GAS PERCENT
15
10
5
0
CO2
TEMPERATURE °F.
900
800
700
600
500
400
300
200
FLUE GAS TEMPERATURE
RETORT TEMPERATURE
0
5
10
15
20
25
30
35
40
45
50
55
60
TIME - MINUTES

WAR TRAINING COURSES IN ELECTRICAL ENGINEERING

By

J. E. HOBSON

The Electrical Engineering Department would normally have a staff of ten or eleven faculty members and would graduate fifty or sixty electrical engineers each year. The war has greatly increased the responsibilities and operations of the department. It now has a full-time war training staff of 185 teachers and technicians under the direction of the permanent staff, and is providing specialized training in several fields to more than five thousand men and women each year. In addition, regular college instruction is maintained for undergraduate and graduate electrical engineers. The war training courses include Signal Corps training for personnel of the U. S. Army; evening courses on the Lewis Campus in radio, electronics, and communications; evening courses on the Armour Campus in elementary electrical theory, electrical machinery, and power systems engineering; and training in industry for employees of certain electrical manufacturing companies.

Signal Corps Training Schools

In June of 1942 three training schools for the U. S. Army Signal Corps were opened. The Pre-Radar Training School is operated under contract with the U. S. Government; the Advanced Electronics School and the Ultra High Frequency Techniques School are operated under the ESM WT program. The trainees are commissioned officers, enlisted men, or men in the Enlisted Reserve Corps of the U. S. Army. The pre-radar training course contains twelve weeks of instruction, advanced electronics ten weeks, and the ultra high frequency course ten weeks. The training in each of the Signal Corps schools is quite intensive, consisting of forty-eight hours of instruction per week. There are three hours of lecture, two and one-half hours of laboratory, and two and one-half hours of conference and problem work each day, six days per week. Men completing the pre-radar course satisfactorily are eligible for admission to the advanced electronics course and later to the ultra high frequency course. A number of trainees have finished the full thirty-two weeks of instruction to become officer candidates in the U. S. Army Signal Corps.

The advanced electronics and ultra high frequency courses are conducted in the main building of the Lewis Campus. Two laboratories, each with a capacity of 125 men, have been put in service for this special program, a transmitter laboratory has been installed with 15 commercial transmitters including one frequency-modulated transmitter, an industrial electronics laboratory is being equipped, and shop facilities for the construction and maintenance of equipment have been provided.

The Pre-Radar training school is housed in a large one-story building adjacent to the main Lewis building. The building was constructed during World War I for aviation training. The building houses class rooms, offices, and store rooms as well as the two pre-radar laboratories, each having a capacity of 125 students.

A school for radio operators and mechanics, also under contract with

SPECIAL TRAINING COURSES UNDER SUPERVISION OF THE DEPARTMENT OF ELECTRICAL ENGINEERING

SIGNAL CORPS TRAINING SCHOOLS

	Graduated		Now in Training	
PRE RADAR (12 weeks)	7 classes	1330	3 classes	653
ADVANCED ELECTRONICS (10 weeks)	5 classes	583	1 class	90
ULTRA HIGH FREQUENCY (10 weeks)	4 classes	334	1 class	82
RADIO OPERATORS SCHOOL (13 weeks)	8 classes	384	2 classes	165
	TOTAL...	2631	TOTAL ...	990

ESMWT PROGRAM

	Graduated	Now in Training
ELECTRICAL ENGINEERING POWER COURSES	416	259
ELECTRICAL ENGINEERING ELECTRONICS & COMMUNICATIONS	1865	780
RADIO MATHEMATICS	238	363
TOTAL...	2519	TOTAL 1402

TRAINING IN INDUSTRY

	Enrolled
WESTERN ELECTRIC COMPANY	180
ALLIS-CHALMERS COMPANY	70
WISCONSIN ELECTRIC UTILITIES ASSOCIATION	75
TOTAL	325
TOTAL GRADUATED TO MARCH 30, 1943.....	5150
TOTAL NOW ENROLLED	2717

the U. S. Government, was opened last October in a building formerly used by the Northern Illinois School of Optometry at 42d Street and Drexel Avenue. The Operators school has been training principally enlisted personnel of the Signal Corps, since excellent housing facilities (required for enlisted personnel) for 500 men are available in the school dormitories. At the present time both enlisted men and civilian ERC trainees are receiving instruction at the school, with laboratory work for the latter group given during the evenings at Lewis.

In the four training schools operated for the Signal Corps of the U. S. Army instruction is given from a level corresponding to first year college mathematics and physics, through senior and first year graduate work in radio engineering. In each of the courses great emphasis is placed upon practical application of theory in the laboratory, and upon use of electronic and radio equipment.

A staff of approximately 185 people has been recruited to provide instruction in the Signal Corps training program. The entire instructional program is under the direction of Professor P. G. Andres, associate professor of electrical engineering. Dr. C. S. Roys, associate professor of electrical engineering, and Mr. L. T. Anderson and Mr. E. H. Schulz, instructors in electrical engineering, are supervisors in the Signal Corps training schools.

Evening Classes in Radio

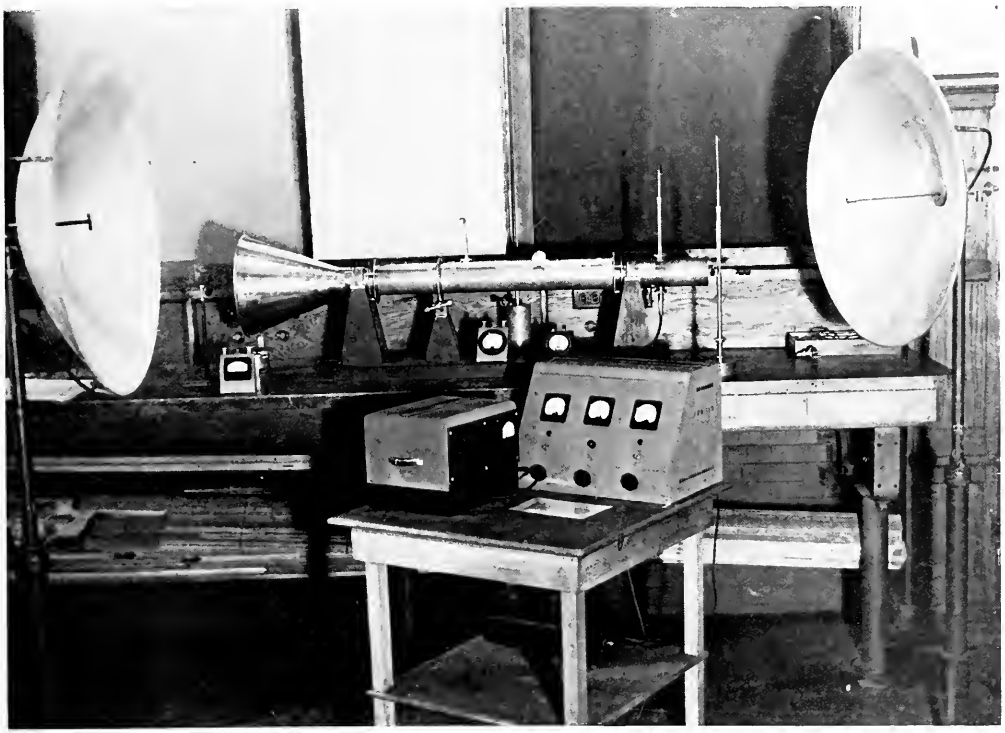
Previous articles and news items in the Illinois Tech Engineer and Alumnus have referred to the training programs conducted in electronics, radio communications, and ultra high frequency techniques. Since September of 1940, large numbers of men and women have been trained in radio theory and practice in evening classes sponsored by ESMWT. In the present series of courses, started in February of this year, approximately 1000 people are registered in three courses in radio mathematics, one course in telephone communications, and nine courses in radio engineering and electronics. All of these courses are given in the evening on the Lewis Campus, using the well equipped laboratories constructed during the past year.

Radio Mathematics

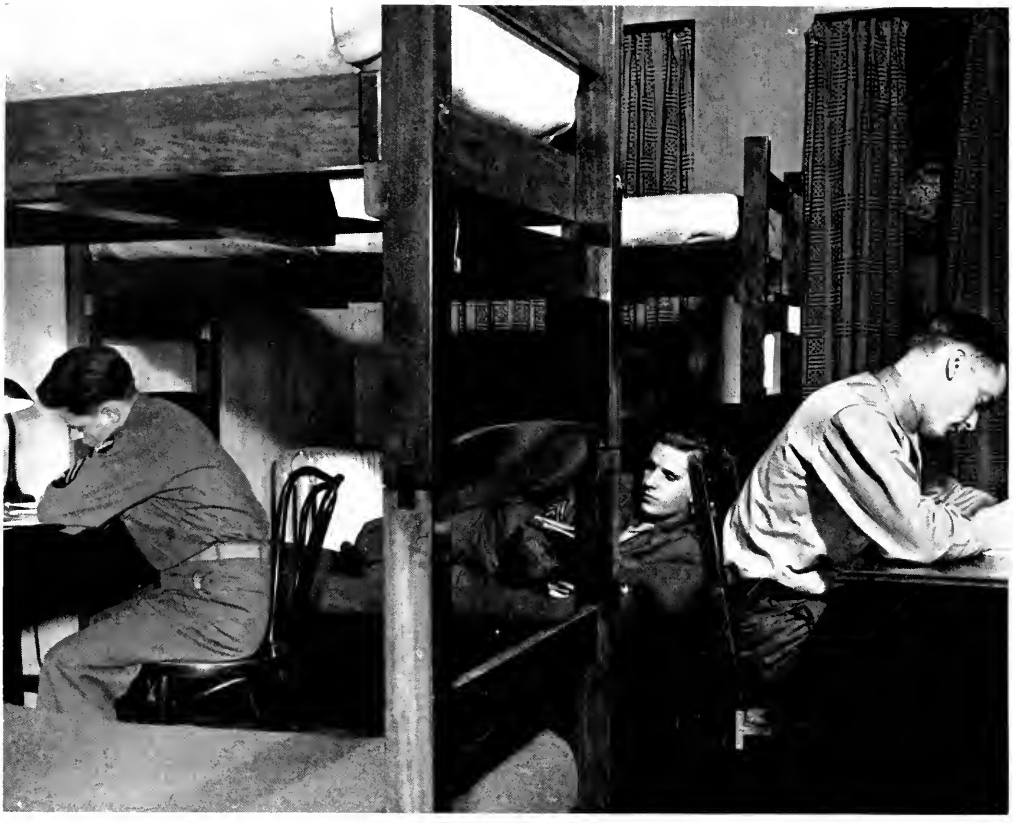
The need for technical training created by the war has also emphasized the necessity for training in basic mathematics. Approximately one-third of the instruction in the Signal Corps training schools consists of mathematics, from college algebra and beginning college mathematics to ordinary differential equations and partial differential equations. The necessity for specialized training in applied mathematics was felt very soon after the evening courses in radio were started. At present there are three courses offered in radio mathematics in the evening, covering the mathematical tools and procedures necessary for an understanding of electric circuit theory and electronics. Possibly never has there been such wide-spread interest in mathematics as at the present time, for large numbers of people are now aware that mathematics is the primary tool of the engineer and technician.

Industrial Electronics

Although the development of electronic tubes and electronic circuits



Ultra high frequency klystron generator, parabolic reflectors and wave guides.



Dormitory room for enlisted men at Radio Operators School.

during the war will be very extensive, we feel that the principal application of electronics after the war will probably be in industrial electronics rather than in communication. To anticipate this trend, a course in industrial electronics for men in wartime industry was announced in February. It is expected that the course will lead into a sequence of courses covering industrial tubes and circuits, process controls, welding controls, rectification, inversion, etc. The program is being developed with the cooperation of several manufacturing companies. There are forty men enrolled in the evening course taught by Dr. H. F. Storm of the Chicago Flexible Shaft Company.

Illumination Engineering

Illumination Engineering is likewise a field rapidly expanding during the war. A course in the elementary theory of illuminating engineering and the application of illuminating equipment to war plants was started in February under the direction of Dean F. A. Rogers and in cooperation with the Chicago Lighting Institute and the Illuminating Engineering Society of Chicago. One half of the class sessions are held in the Chicago Lighting Institute, which has some of the finest equipment in this country for the demonstration of illuminating equipment and the solution of illuminating engineering problems. The other half of the course is given in the illuminating engineering laboratories on the Lewis Campus, recently revamped and extended to meet the needs of this program. It is expected that the elementary course now being given will lead into a series of courses covering the field of illumination engineering from the elementary level to advanced graduate work. The classes are taught by Mr. J. A. Harrington of the Commonwealth Edison Company, with a staff of assistants to handle the laboratory work at Lewis.

Telephone Engineering

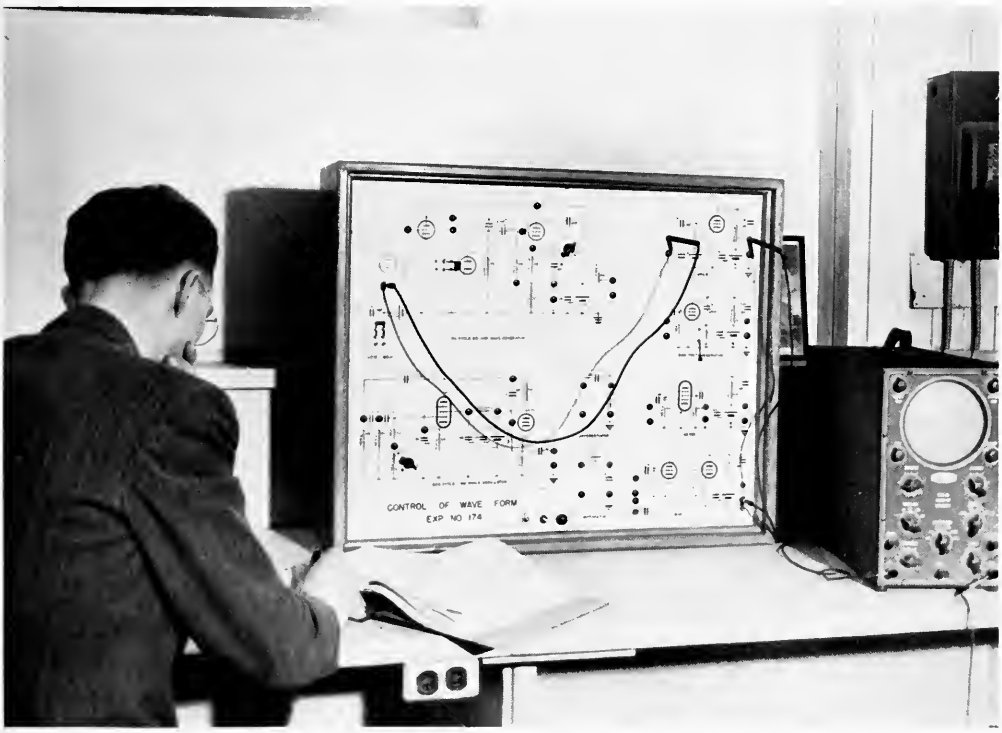
Increased activity in telephone communications brought about by the war has led to the demand for a war training program in telephone engineering. Approximately seventy students are enrolled in this ESMWT-sponsored evening course taught on the Lewis Campus by Mr. F. E. Lee of the Illinois Bell Telephone Company. Demonstration and laboratory equipment is rapidly being accumulated in telephone engineering, and we expect this field to be one of the important divisions of the department during the war and afterward.

War Training for Industry

In addition to the courses given wholly or in part to meet the general needs of wartime industry, several specialized courses are offered to train directly the employees of certain companies engaged in war production. These industrial training courses are also sponsored by the ESMWT program but are given during working hours and are open only to company employees. One example of this specialized type of training is a course in elementary radio theory and radio measurements given jointly by our department and the Western Electric Company for new women employes of the Western Electric Company. Approximately 180 women are given twelve hours of instruction per week in elementary radio theory and in the use of radio measuring devices. The course is given on the Lewis Campus and in the Hawthorne Works of the Western Electric Company.

Industrial training programs emphasize the need that has long existed for engineering educational institutions and industry to work together in the training of industrial employes, both at the undergraduate level for non-college trained personnel and in advanced training for graduate engineers. Fortunately the war is causing industry and the colleges to work closer together, and we believe the cooperation will continue after the wartime emergency is past.

A training course for graduate engineers of the Allis-Chalmers Manufacturing Company is being given in Milwaukee. The class meets once in two weeks to discuss the theory and application of symmetrical components. For eighteen months the Department of Electrical Engineering has cooperated with the Westinghouse Electric & Manufacturing Company in sponsoring a series of lectures for engineers of the Wisconsin Utilities Association in Milwaukee. This group meets in the Public Service Building in Milwaukee and includes 75 engineers from the electric utility companies operating in the state of Wisconsin. The results of such cooperative training programs in industry illustrate the great amount of mutual benefit which may come from a close association between engineering colleges and the active engineering industries.



Experiment in advanced electronics.

PHYSICAL TRAINING GOES TO WAR

By
ARTHUR E. WRIGHT

The Lewis Institute Division of Illinois Institute of Technology, founded forty-seven years ago, has experienced revolutionary change since Pearl Harbor, not the least of which has been the adoption of a war time physical education program. This program was a direct outgrowth of the alarm over the fact that so large a percentage of young men of military age were rejected for military service because of unsatisfactory physical condition. The alarming statistics were brought to the attention of one thousand college administrators by the Committee of Military Affairs of the National Committee on Education and Defense.

The Army and Navy have clearly demonstrated the immediate and imperative need of improved curricula of Physical Education, adopted to the preparation of youths for war, in our colleges. At Illinois Tech, physical education has become a required course for all student members of the Enlisted Reserve Corps of the Army, Navy, and Marines and also for all freshmen. All other students are encouraged to participate in the program. Each male student at the Lewis Division attends four fifty-minute physical training classes each week. Realizing that the qualities of a good athlete are the qualities of a good soldier; that no one sport is adequate for all-round physical conditioning but rather that each sport has a part to contribute to the conditioning of men for combat; that the peace-time philosophy of varsity sports for a select few had neglected the undeveloped student who was most in need of development; and that poise, aggressiveness, courage, and stamina are all-important; the present author examined the entire program of physical education and selected those activities most valuable in the training of men for the arduous events of war.

For the wily strangler who creeps up from behind—a body slam and a broken arm.

Because nearly all peace-time athletic work has neglected the muscles of the arms, back, and shoulders, and because the military have found young Americans,—too often taught only recreational activities of leisure-time value in their middle and old age,—lacking in arm and shoulder strength, our program emphasizes the development of these parts. In order that our Techmen shall not stagger under the load of physical exertion demanded of them, when inducted, as have countless thousands of other inductees, we have patterned our war-time physical training after that of the military,—using similar exercises, activities, and apparatus to a large extent.

The nation's leading centers of physical training, today, are the Navy's pre-flight schools at which emphasis is placed on military track and the traversing of obstacles courses.

Not having outdoor space available on the Lewis Institute campus for the erection of an obstacle course, we have, after making an exhaustive study of such apparatus, devised gymnasium activities which vigorously call into play all muscles used in obstacle courses and which involve similar movements,—i.e., running, vaulting, throwing, jumping, climbing, carrying, crawling, dodging, balancing, swinging, pulling, and pushing.

Our program is progressive;—young men, who at the beginning of the current semester could complete only ten laps around the gym "on the double" are now beginning each period with thirty laps (one mile). Many who could perform but six or eight floor dips (push ups) are now doing twenty, and students who could "chin" themselves a scant four or six times can climb a rope to the gym ceiling several times.

Tumbling, the ability to handle one's body in the air and fall safely

—of value to the commando, paratrooper, and others—is learned by our students.

Combatives, both man-to-man and group, teach our men to pit their strength and skill against an opponent's and to continue far beyond "peace-time" fatigue and pain.

Of greatest interest to the men are Judo and Jiu Jitsu. Our men, weaponless, are taught to disarm and conquer an enemy armed with pistol, dagger, or bayonet. Desiring to equip our students to beat the enemy at his own game we train them in the art of Jiu Jitsu. To throw an enemy over one's leg or hip or shoulder; to dislocate or break his arm; to strangle him adeptly "at one's leisure"; to inflict upon him great pain by pressure on exposed nerves; to strike him in vital spots;—to use his weight and strength to destroy him—these are the secrets of hand-to-hand fighting that our students take with them to the battle fields of this total war.

Group effort and body contact in sports, such as soccer, are teaching our men united effort. Marching tactics teach them to act on the field of battle in response to commands and with concerted effort.

Calisthenics — gymnastics — long since shelved as medieval by all but the Y.M.C.A. have been resurrected from another era and are, throughout the armed forces and colleges of America, developing and conditioning youth for the dynamic experiences of youth. Slim waists and deep chests, broad shoulders and strong arms, powerful backs and legs, and fighting hearts are more in evidence in America today than for many a year.

Agreed by officials of the armed forces to be the physical skill of greatest importance today, swimming is a major activity of our men students at the Lewis Division of Illinois Tech. Ability to swim to a raft or floating wreckage, to swim to shore several miles distant, to swim beneath flaming oil or underwater to safety from enemy fire, to carry your injured, unconscious, or "non-swimmer" buddy to safety through deep water are of great importance to the successful prosecution of the war.

Our students learn to enter the water feet and head first from different heights; they are trained in resting and long-distance strokes, endurance swimming, underwater swimming, surface diving for lost articles, artificial respiration, and the several approaches, breaks, and carrys of aquatic life saving.

The location and manner of stopping arterial bleeding by use of arterial pressure points—of interest to

(Turn to page 48)

Above: The rope climb develops health and strength for fitness, for life, for a victorious America.

Below: To clear barb wire—dive—do a forward roll. Techmen learn to fall—to dive for cover.

A PROGRESS REPORT ON THE WAR TRAINING PROGRAM

By

J. I. YELLOTT

War training at the Institute continues to progress, following the basic pattern which has been established during the past two years. Since the publication of the last report, however, a significant development has taken place in the Safety Training Program. Three full-time safety courses are currently in operation, each established at the specific request of the appropriate Army official. Courses are now operating for the Safety and Security Branch, Office of the Chief of Ordnance; for the Internal Security Division, Office of the Provost Marshal General; and for the Civilian Personnel Branch, Services of Supply, Sixth Service Command.

Instruction in Industrial Safety Engineering was first undertaken in the spring of 1941, when a single evening course was included in the second program of part-time courses. Dean Keefer, Safety Engineer for the Lumbermen's Mutual Casualty Company, was the instructor of this pioneer group. In the fall of 1941, a very large evening program was undertaken at the request of the National Committee for the Conservation of Manpower in War Industry, with the cooperation of the Greater Chicago Safety Council and the Chicago Board of Education. A group of forty prominent industrial safety engineers was recruited to instruct in this program, and they were given intensive instruction by Messrs. Roche and Stennett, of the National Safety Council, in the teaching of safety. This large-scale evening safety-training program has been repeated twice since the first course, and more than 1500 men and women from 300 Chicago industries have been trained in the principles of accident prevention.

Full-time, in-service training in fire and accident prevention was first undertaken during August of 1942, at the request of the Explosives Safety Branch, Office of the Chief of Ordnance, which was established in Chicago late in July. This branch is headed by Colonel Francis Miles, a veteran Army officer with a distinguished record of service in World Wars I and II and an outstanding authority on explosives. Colonel Crosby Field, a prominent engineer from New York, is second in command, and he is ably assisted by Captain William Cutter as executive officer and chief of the training division.

The establishment of this branch, since designated as the Safety and Security Branch, fixed upon Colonel Miles and his associates the responsibility for maintaining safe and continuous production in the six hundred explosives plants which are scattered throughout the nation. While the commanding officer and the management of each plant are directly charged with responsibility for the safety and security of that plant, Colonel Miles' branch must supervise their activity and establish operating policies on a nation-wide basis.

After surveying the situation, Colonels Miles and Field determined that an important part of the activity of their branch must be the detailed inspection of every phase of explosives plants which might in any way interfere with the continuity and safety of their operation. Since it was obviously impossible for Colonels Miles and Field to inspect every plant in person, they created a force of "safety auditors," charged with the duty of making detailed "audits" of the safety and security situation in every explosives plant. Virtually no experienced explosives safety personnel were available, and so a suitable force had to be recruited and trained.

Men with fire protection or industrial safety background were sought, as were outstanding engineers with experience in raw material and explosives manufacture. In order to train these men in the exacting duties of the "safety auditor," Illinois Institute of Technology was requested, through the War Training Program, to set up an intensive course in Explosives Safety Engineering. Since this course differed from any previous activity, a council of war was called at which Colonel Field and Captain Cutter explained the situation to Professor Finnegan, Director of the Fire Protection Curriculum; Mr. E. C. Woodward, Safety Training Director; Mr. Bernard Weissman, Supervisor of War Training students; and the writer. A time limit of six weeks was imposed, since speed in putting safety auditors in the field was essential. A course was accordingly devised which called for forty-eight hours of class or laboratory work each week, for the specified six weeks.

The course included approximately seventy hours each of Industrial Safety and Fire Protection Engineering; sixty hours of Explosives Chemistry and Manufacture; twenty hours study of the Ordance Safety Manual, the Bible of the S. and S. Branch; thirty-five hours of Personnel Problems; twenty hours on S. and S. Branch Procedures; and fifteen hours of quizzes and miscellaneous topics.

Instruction in Industrial Safety was entrusted to Harry Matthewson of the National Safety Council, whose efforts were supplemented by John Roche, Joseph Stennett, and Clark Bridges of the Council, Paul Beedle, Ernest Beaumont of Peoples Gas, Warren Cook of Zurich Insurance, and Clark Woodward. The Safety work was based on the standard evening course, condensed and amended to meet the specific needs of the S. and S. Branch.

Fire Protection Engineering was delegated to Professor Finnegan, who completed arrangements with Underwriters' Laboratories for both lecture and laboratory work. John Neale, Chief Engineer of the Laboratories, has given much of the lecture work, while Professor O. L. Robinson, a member of the Laboratories staff and of the Institute faculty, has been in charge of most of the laboratory demonstrations. The War Training Committee here gratefully acknowledges the invaluable assistance given by the Laboratories, particularly by Messrs. Nuckolls, Neale, Robinson, Alcott, Matson, Trovillo, Rillings, Benjamin, and Wright. John Ahern, F.P.E. '35, completed the course in the third section, and he is now cooperating with Professor Finnegan and Mr. Neale in administering the fire protection part of the course.

The Safety and Security Branch, and the Institute, were extremely fortunate when the Boston Ordnance

District made available, as the Instructor in Explosives Chemistry and Manufacture, Lt. Colonel C. S. Robinson, who was for many years prior to the war Professor of Chemical Engineering at Massachusetts Institute of Technology. Colonel Robinson has the unenviable distinction of being the longest range commuter in the War Training Program since he makes the round trip from Boston to Chicago each week in order to give his lectures to the class. By combining an unusual gift for teaching with a thorough knowledge of the latest developments in his subject, Colonel Robinson has succeeded in the difficult task of making the chemistry of explosives understandable even to those whose background in organic chemistry is fragmentary. The War Training Committee wishes to thank Colonel Robinson for his outstanding service to the course.

Instruction in the Ordnance Safety Manual was delegated to appropriate officers from the branch, among whom should be mentioned Major W. M. Cobb who was one of the authors of the Manual. This book, which can hardly be described as light reading, includes the quantity-distance tables, which state just how much of various kinds of explosives can be stored in what proximity to other quantities of the same or different explosives. Many books of safety regulations are in existence, and their admonitions are often honored more in the breach than in the observance, but not so with the Ordnance Safety Manual. If a safety rule is violated in an ordinary plant, the results may be unpleasant or even disastrous to one or two individuals. Violations of the advice of the Ordnance Safety Manual may easily result in a large-scale disaster.

The maintaining of safety in plants, regardless of the product which they are making, is largely a matter of personal and personnel attitude. In this training course, the subject of Personnel Problems has been handled with outstanding success by Dr. John H. Hazlehurst, a well known consultant in industrial personnel problems. Through his activities, the members of these classes have been acquainted with some of the fundamental psychological factors underlying the behavior of people. They have also been exposed, through an appreciation session, to Job Instructor Training, and, as a very recent development, a new technique of Job Safety Training has been devised. For that continually decreasing minority which is not yet familiar with Job Instructor Training, it should be pointed out that this is one of the services of Training Within Industry, providing a "packaged," streamlined, in-plant training course, by which supervisors and lead men are taught how to teach. The four-step training method is used, in which the worker is prepared to learn, then his job is presented to him by both showing and telling. He is then allowed to perform the job, under the immediate supervision of his instructor, and each step must be done carefully and correctly, with the learner telling the instructor why he does each particular part of the job. Finally, the worker is put on his own, after the instructor is thoroughly satisfied that the worker knows the job. By combining the four-step training technique with carefully prepared job breakdowns, industry has found it possible to teach unskilled workers in a very short time to perform difficult tasks. Job Safety Training follows much the same pattern, but with greatly increased emphasis on safety.

Safety auditors must be thoroughly familiar with the policies and procedures of the Safety and Security Branch, and accordingly detailed study is given to plant security problems, branch organization, etc. Instruction in this part of the course has been handled by appropriate officers of the branch.

The seventh section of this course is now in operation. Graduates of the Institute's Department of Fire Protection Engineering have been in great demand for this type of work, and many of them have completed the course. They include John J. Ahern, '35; Fred Anderson, '37; Roy W. Carlstrom, '33; Everett R. Cole, '18; Benjamin E. Flood, '41; Edgar R. Johnson, '36; Harvey A. Koge, '28; Joseph R. Lossman, '30; Morton E. Luber, '40; Armin J. Mueller, '32; Harry F. Perlet, Jr., '38; P. V. Smith, '35; George N. Svehla, '37; Claude M. Westerman, '31; and Richard E. Winkler, '37. J. Earl Harrington, Ch.E. '26, was one of the first men added to the staff, and he is now in charge of the raw materials division. Other Institute Alumni are: George F. Kahle, Ch.E. '38; Donald C. McDougal, M.E. '28; Jacob H. Markham, Ch.E. '19; Warren Schreiber, Ch.E. '37, and Ralph R. Tullgren, C.E. '39.

This course in Explosives Safety Engineering was an experiment, since nothing of this nature had been tried before, but its success is demonstrated by the fact that the graduates of the course are now performing satisfactorily in the field, and the safety record of the explosives plants of the nation is extremely good. The Institute may well be proud of its alumni who are performing this essential war-time duty.

Now, after the successful completion of the first two sections of Explosives Safety Engineering, the Institute was asked by the Internal Security Division, Office of the Provost Marshal General, Washington, D. C., to give a short, intensive course for Internal Security Division inspectors. This course was organized at the request of Colonel A. B. Johnson, Head of the Production Security Branch, to whom was given the responsibility for expanding the activities of the Internal Security Division to include safety as well as those matters which are associated with fire prevention and security. Since the outbreak of the war, the Internal Security Division had been charged with the setting up of fool-proof systems for plant identification, fingerprints, guards, and other measures to prevent sabotage and espionage. Late in 1942, the War Department realized that interruptions to production caused by accidents and fire were even more serious than the acts of enemy agents. Accordingly, the activities of the Internal Security Division were extended, and the inspectors, who were formerly concerned only with matters relating to sabotage, found that their responsibilities had been enlarged, and that they were required to report on the fire prevention and accident prevention activities in their assigned plants.

Most of the original group of plant protection inspectors had some background in fire prevention work and accordingly the first section of the new course, Plant Protection Engineering, was devoted primarily to industrial safety. This course originally lasted only two weeks, but it has been gradually lengthened until the current sections are in session for three weeks. The course has been enlarged to include a survey of fire protection engineering, and the long experience of Professor Finnegan in this field has enabled the War Training Committee to prepare an effective training course. The industrial safety portion of the course has been handled largely by Mr. Clark Woodward, Safety Training Administrator for the Institute, and Mr. Paul Beedle, Consulting Safety Engineer. Other members of the Safety Training Staff have also contributed to the success of this program.

The Plant Protection Engineering course at the Institute has become the center for the training of Internal Security Division inspectors from Service Commands Five through Nine. Men from the eastern Service Com-

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AUTOMOBILE DRIVING AS A PROBLEM IN MECHANICS

By

J. F. MANGOLD

This discussion is intended as a sequel to the article which appeared in the issue of the *Illinois Tech Engineer and Alumnus* for March, 1942. The emphasis in both of these articles is on the so-called practical phases of the problem. That "Automobile Driving" could shape itself as a problem in any kind of scientific sense seems quite unthinkable to entirely too large a proportion of the automobile driving population. This is not much in the consciousness even of technical students with a knowledge of mechanics unless specific attention is called to the problem.

It seems desirable at the outset to call attention to the fact that as operators of vehicles we vary a great deal in our abilities to perform certain functions. This great difference is largely due to what is called Reaction Time. The reaction time includes the time required to observe the behavior of other traffic, plus the time to decide on a course of action, plus the time needed to apply the brakes, or step on the accelerator, or turn the steering wheel. It may vary from 0.3 second to 2.0 seconds, and because of this variation it is something that the individual should be conscious of and informed about. It should be clear that slow reaction time does not reflect on the driver in regard to his general knowledge of the mechanism nor his ability to handle that mechanism in his own driveway. But the difference between driving on a deserted highway and driving on one which is crowded with traffic may readily spell the difference between complete safety on the one hand and continuous hazard on the other. In some circles the incidents involved in reaction time are given the term Human Equation, with the added inference that this human equation is erratic and not solvable. However, in the light of the foregoing explanations, a serious second thought will establish the fact that the human equation is much more definite than is ordinarily supposed, and that reliable numerical values are obtainable. Thus, in the case of a car moving at 30 M.P.H. or 44 f.p.s., the car will move 22 feet while the driver is observing the situation and deciding what to do, if his reaction time is 0.5 second. Anyone with even the slightest experience on the road will acknowledge that this amount of displacement, practically uncontrolled, may mean a definite hazard in traffic.

About ninety percent of serious accidents occur because the driving has been too fast for road conditions. Such a statement implies two things; first, that the driver is definitely not aware of the forces involved, and secondly, that his reaction time is a quantity which he does not appreciate. A great deal has been said about various psychological factors in the design of highways and their signs, curbs and painted center lines. However, all these mean very little unless the driver is aware both of the sign and of his reaction to it. Any driver may check himself quite closely by having an observer ride with him and simulate an emergency condition. By means of a stop watch or even an ordinary watch with second hand, the observer may note the performance of the driver. The experiment of coming to a stop is a good one. It is also possible to observe the location of the car at the beginning of the timing and at the instant that the brakes are applied. For practical purposes the distance between these two points may be paced and a fairly accurate measure of reaction time obtained. It is rather illuminating for the driver to discover these quite measurable intervals when he no doubt had the idea that his response was almost instantaneous.

It may be interesting to speculate on a problem in which two cars are approaching an intersection. See Fig. I. Assume car A is moving north at 60 M.P.H. and is 390 ft. from the center of an intersection at the instant car B is observed. Car B is moving west at 60 M.P.H. and is 725 ft. from the intersection at the instant car A is observed, but, having the right-of-way, car B continues without reducing speed, and reaches the center of the intersection in a time of $725 \div 88 = 8.23$ secs. The driver of car A considers the situation and decides to stop as quickly as possible. Assuming his reaction time as 0.5 sec., he has traveled 44 ft. nearer the intersection and is now $390 - 44 = 346$ ft. from the center of the intersection. Assuming a coefficient of friction of 0.35, then by the relation between work and energy, $0.35WS = \frac{1}{2}W/32.2 \times 88^2$; and solving, $s = 343$ ft. Under these quite reasonable conditions, car A will come to a stop within 3 ft. of the intersection. The total time needed for car A to come to a stop will be the reaction time plus the time to move 343 ft., during which the average velocity would be $88 \div 2 = 44$ ft. per sec. Then time of stopping $= 0.5 + 343 \div 44 = 8.3$ secs. In this same length of time car B will have traveled a distance of $88 \times 8.3 = 730$ ft. so that the center of gravity of car B is 5 ft. past the intersection, while the center of gravity of car A is within 3 ft. of the intersection. The reader is expected to draw his conclusions. Collisions under conditions similar to these assumed have occurred many times. In this hypothetical case, the driver of car B could have accelerated and thereby avoided the crash. Thus the vital split second involved in the reaction time becomes an important factor in distance traveled during an emergency and may be equally important in accelerating or in decelerating or in swerving from the road.

Closely related to both the mechanics and the reaction time is the matter of the visibility of the roadway. To appreciate the real safety of his driving, the motorist needs to be conscious of his sight distance, which has been defined as the mutual visibility of two points about 5 ft. above the ground. Such sight distance is important for safety on straight alignment, but with undulating grades, that is, where there are a

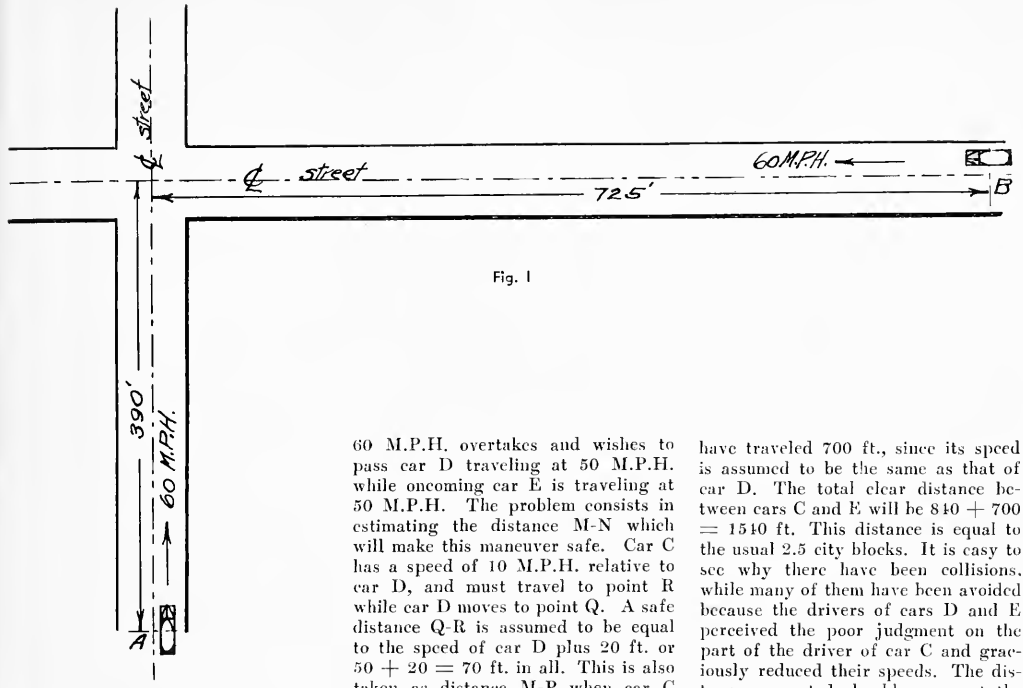


Fig. I

series of hills and valleys close together, the driver must be able to look over the apex or summit if he wishes to maintain his speed; otherwise the cautious driver will materially reduce his speed in the interests of safety. Here the stopping distance of a car assumes great practical importance. Visibility as affecting reaction time is most vital to the driver passing one car while another may be coming in the opposite direction. On horizontal curves as well the motorist must be certain of his visibility. Almost invariably he will swerve in such direction as to reduce the curvature. This tendency on the part of the going as well as the oncoming motorist may develop a very serious safety hazard. Thus, in Fig. II, car C, traveling at 60 M.P.H. overtakes and wishes to pass car D traveling at 50 M.P.H. while oncoming car E is traveling at 50 M.P.H. The problem consists in estimating the distance M-N which will make this maneuver safe. Car C has a speed of 10 M.P.H. relative to car D, and must travel to point R while car D moves to point Q. A safe distance Q-R is assumed to be equal to the speed of car D plus 20 ft. or $50 + 20 = 70$ ft. in all. This is also taken as distance M-P when car C contemplates passing car D. Thus it is seen that car C must travel from M to R, while car E will travel from N to R. Car C must have returned to its proper lane before car E reaches a point opposite in the oncoming lane. The problem consists in computing the clear sight distance M-N. Thus distance M-R will be equal to 2×70 plus distance P-Q. The time interval for car D from P-Q will be the same as the time interval from M to R for car C, since car C must move from M to R, while car D moves from P to Q. Equations may be formulated as follows: Let t be the time involved between M and R. Then $PQ = 50t$ and $MR = 60t$. Solving the equations for PQ by eliminating t, where $PQ \div 50 = t$. Then $2 \times 70 + PQ = 60 \times PQ \div 50$; $140 + PQ = 6PQ \div 5$; $140 = PQ \div 5$; $PQ = 700$ ft; car C will now have traveled $700 + 140 = 840$ ft. while oncoming car E will have traveled 700 ft., since its speed is assumed to be the same as that of car D. The total clear distance between cars C and E will be $840 + 700 = 1540$ ft. This distance is equal to the usual 2.5 city blocks. It is easy to see why there have been collisions, while many of them have been avoided because the drivers of cars D and E perceived the poor judgment on the part of the driver of car C and graciously reduced their speeds. The distance computed should represent the visibility of the driver of car C who should not attempt to pass except under conditions as specified or with car D moving very slowly. With the present restricted speeds and fewer cars the problem is proportionately less urgent at this immediate juncture. It should also be stated that the distance above computed should be available even though no oncoming car is visible at the moment.

Probably one of the most important and yet the most abstract relation concerned with the forces acting on any self-propelled vehicle is the tractive force which is the equivalent of the friction between the tires and the roadway. Fig. III shows a diagramatic attempt to illustrate the transmission of force and turning moment from engine crank-shaft and through the drive-shaft to the rear axle. Thus the force due to the explosion of the fuel in the engine cylinder produces a turning

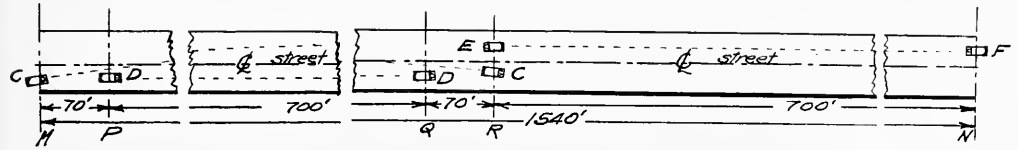


Fig. II

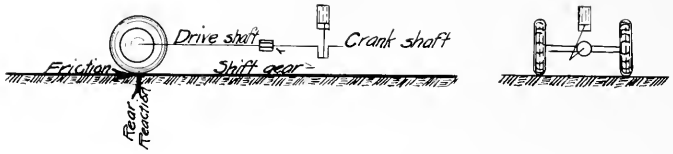


Fig. III

moment which rotates the drive shaft, which in turn through reduction gears drives the rear axle. As can be seen, the turning moment transmitted to the rear axle by the engine must not be in excess of the product of friction times the radius of the driving wheels. If the transmitted torque is in excess of the resisting torque due to friction, the driving wheels will slip. Thus the force which is external to the car and which is a measure of the driving force is actually the friction which is developed between the drivers and the roadway. Thus, let it be assumed that an engine develops 80 Hp. when turning over at the speed corresponding to 50 M.P.H. and that the efficiency of transmission is 85 percent. If the radius of the rear wheel is 15 inches, then Frie. $\times$ 15 = .85 $\times$ torque transmitted. A simpler relation is represented in the work equation, or Frie. $\times$ 5/6 $\times$ 88 = .85 $\times$ 80 $\times$ 550. The right-hand side of the equation is work transmitted per second and the left-hand side is the work done by the external force. Solving the equation, Frie. = 510 lbs. This is the value of the driving force. In order to be able to function as assumed, the coefficient of friction between tires and roadway multiplied by the weight on the drivers must equal 510 lb. or .35 $\times$ (.6 $\times$ W). With a car weighing 3000 lbs., the friction available would be amply in excess of the amount of force needed. In this illustration the intent is to bring out the fact that while there is ample power in the engine, this power alone may be far from sufficient for the proper control of the car when the control really is centered on four relatively small areas of contact between the tires and the roadway.

To save gasoline the motorist should be conscious of the grade which will allow the force of gravity to overcome the resistance to motion of the car. No tractive force will be needed, and fuel consumption will be limited to the amount necessary to keep the engine just turning over or idling. The consumption of gasoline means that heat units have been either usefully employed or have been wasted. All these heat units represent potential foot-pounds of work. Thus, the usual pound of gasoline will contain about 20,000 B.T.U.'s. Since each B.T.U. can be converted into 778 ft.-pounds of work, the pound of gasoline contains the equivalent of 778 $\times$ 20,000 = 15,560,000 ft.-lbs. If this were to be completely converted, it would represent an energy capable of lifting a 1000-pound weight to a height of three miles. To most of us, the gasoline is a liquid which passes through the fuel tank and carburetor, and its ultimate conversion into force and work done is an incident not reflected on by the large percentage of motorists.

When the motorist fills out the application blank for a state license, he finds that the fee depends on the horsepower, which is expressed as: HP = .4Cd^2, where C represents the number of cylinders and d is the diameter or bore of the cylinders. Most motorists do not know the origin of this equation, so the derivation will be given. The equation for the horsepower of a single acting engine is: HP = PLAN $\div$ 33000, where P is the average pressure in lbs. per sq. in., L is the length of the stroke in feet, A is the cross-sectional area of the cylinder in square inches, and N is the R.P.M. The factor (P $\times$ A) represents force in lbs. Then (P $\times$ A)L is equivalent to the product of force times displacement which is called work and is expressed in foot-lbs.; it is the amount of work per stroke. If the factor N is introduced, then the displacement per minute is L $\times$ N, and the expression yields the work done per minute. This same equation expressed in a slightly different combination will give the horsepower of the motor. Thus, assume that the mean pressure in the engine cylinder is 80 p.s.i. The product L $\times$ N is assumed as 1000 ft. per minute which may be called the piston speed, and involves two strokes per revolution. In the automobile engine there is one power stroke for two revolutions, or one power stroke out of each four strokes. In accordance with the previous assumption, the displacement while power is being delivered by any one of the cylinders will be 1000 $\div$ 4 or 250 ft. Setting up the equation, with an 85 percent efficiency,

$$\text{Hp} = \frac{\text{C } .85 \times 80\pi d^2 \times 250}{4 \times 33000} = .4Cd^2.$$

Thus the expression is entirely rational, although the assumption of the numerical values is empirical.

In approaching a stop sign, a logical procedure consists in allowing the motor to idle but with the clutch connected, so that the motor in decelerating will serve as a brake. Also the brakes should be applied as necessary until the car is almost at a standstill before pressing on the clutch lever. The deceleration resulting from the use of the motor as a brake amounts to an average of 1.7 ft. per sec. per sec. In general, one-fourth of the braking can be accomplished by means of the engine. Closely related to the above is the need for observing the condition of roadway to determine the variation in the coefficient of friction, which has values of 0.1 for icy pavements to 0.6 for dry pavements. The driver needs to allow himself six times as much space on icy pavements as he does on dry pavements in coming to a stop. Further if stopping is attempted in one-half the usual distance, then twice as much friction is needed and there will be twice as much wear on the tires.

Acceleration may be as important a safety factor as braking. The acceleration of an automobile is greater in the lower gears than in the higher. The expert driver will shift from high gear to second at speeds below 30 M.P.H. in passing cars, when other conditions might present a hazard. The increased acceleration is due to the larger frictional force as a result of using a higher gear ratio. Another useful hint to the motorist is to turn the wheels in the direction in which skidding takes place. The driver thus introduces a curvature whose center is on the side toward which skidding is taking place. Since the car will be moving in a curved path a centrifugal force will result which will act to overcome the skidding.

THE TECH RELAYS

The Illinois Tech Relay Games of 1943 did not wait until the night of the meet to break records—and as a result the fifteenth annual running of the Games was a record-breaking event from beginning to end.

The record broken before the meet even opened was that of the number of universities entered—twelve universities, including the Big Six, the Big Ten, the Missouri Valley, and the Central Collegiate champions, as well as the Relays' defending champion, were entered for an all-time high.

The Relay Games also set new records in the amount of publicity accorded the meet.

A capacity crowd jammed the University of Chicago Field House, where the meet was held on Saturday, March 13, to watch the star-studded Relays field break four records and tie two others. The Big Ten meet the week before in the same field house had not produced a single broken record. Sports experts predicted that few, if any, track meets would have broken records in this war season.

But in this war year—the fifteenth year of the Relays—the Illinois Tech Relay Games rose to the occasion and really came into their own. With 421 athletes representing 36 teams (24 colleges and 12 universities), it was the largest indoor collegiate track meet in the nation during 1943.

New team champions were crowned in both university and college divisions.

Notre Dame ran away from the field of universities amassing 61 11/28 points. Illinois and Michigan won the second and third-place trophies, the former with 37 9/14 points and the latter with 28¼. In winning the third-place trophy, the Wolverines barely nosed out their fellow statesmen and defending champions, the Michigan State Spartans, who scored 28 1/7 points.

Michigan Normal, winner of the college division in 1939, 1940 and 1941, regained its throne after a year's absence. The Redskins had a close battle with Miami University of Oxford, O., a team which was competing in the Tech Relays for the first time. Miami, champions of the Butler Relays last year, scored 32 points for second place, and Western Michigan College of Kalamazoo finished third with 23 points, just four-fifths of a point ahead of DeKalb (Ill.) Teachers. Loyola, defending champion, scored only 10 points and finished in a tie for eighth.

Both college and university two-mile relay teams raced to new records, for half of the four new records entered in the books. Miami's quartet broke the college record by doing the distance in 8:48.1, one-half of a second faster than Michigan Normal's time of three years ago. And Notre Dame wrote a new university record into the books with a time of 7:46.7, displacing the 1940 record of Marquette of 7:52.4.

Miami's record-breaking performance set the pattern for the meet, as it was in the first event of the 1943 Relay Games program.

The most spectacular record-breaking performance, however, was by Dwight ("Dyke") Eddleman of Illinois in the high jump. Eddleman, a freshman, made eligible only a week before when the Big Ten dropped its freshman rule, was competing in his first and last varsity meet, as he was facing a call to the armed services which came the next week after the meet.

He jumped 6 feet, 6¼ inches, and not only broke the university high jump record of 6 feet, 4 inches, set by Ed Burke of Marquette in 1939, but also eclipsed the Tech Relays record of 6 feet, 6 inches, held by Norman Bechel of Northern Illinois since 1936 and tied the Field House record set by Dave Albritton of Ohio State in 1938. For this performance, Eddleman has been recommended for a varsity letter by his coach.

Fourth record broken was by St. Ignatius High School in the Catholic High School Half Mile Relay. The St. Ignatius quartet did the distance in 1:36.7 bettering its own record of 1:38.8 set in 1942.

Michigan State's sprint medley relay team tied its own record of 3:31.6 set in 1942, and Harrison Dillard of Baldwin-Wallace tied the college 70-yard high hurdle record of :08.9 set by Allan Tolmich of Wayne in 1937 and equalled by Charles Hlad of Michigan Normal in 1940. Dillard tied this record twice, once in the preliminaries and again in the finals.

Dillard was also the only individual performer to win two titles at the Tech Relays, winning the college low hurdles as well as the high hurdles.

But James Fieweger of Lawrence College, the defending champion in both college hurdle events and the man that Dillard dethroned, was the individual star of the Relays. Fieweger saved himself a second in both hurdles events, added a second in the college shot put, and won the college high jump at 6 feet, 2 inches for a total of 17 points. His 17 tallies not only made him high point man of the meet, but also placed Lawrence fifth in the team standings.

High point man in the university division was Maurice Alexander of Missouri. He won the 70 yard high hurdles and finished second in the lows for nine points.

The 1943 meet was anything but a one-man show, for it featured the most brilliant constellation of stars ever gathered for the Tech Relays. The stars assembled included:

Nine individual champions of the 1942 Tech Relays back to defend their titles.

Every individual champion, 11, for the 1943 Central Collegiate championship meet, and all but three of the point winners (47 out of 50) in this meet.

Eight Big Ten champions, and 38 of 55 point winners.

Four Bix Six champions.

Eight of the nine champions in the Michigan State Relays Carnival.

Two stars of the national A. A. U.

And numerous champions of the various small college conferences.

But the real champion of the meet was John J. Schommer, who conceived the idea for the Tech Relays in 1928, began the meet in 1929 and built it to its present position. The ovation given Schommer, director of athletics at Illinois Tech since 1912, when he was introduced to the 1943 Relays crowd proved without a doubt that the fifteenth annual running of the Games was a success.

P. O. Ridings.

THE ALUMNI FUND

A "living endowment" of more than a million dollars—that is what alumni of Illinois Institute of Technology created for their Alma Mater in 1942 when they established the first annual Alumni Fund.

And now in process is the second annual Alumni Fund of Illinois Institute of Technology.

The second Alumni Fund drive opened on Thursday, April 29, at a dinner meeting, and it will continue through June 18. However, the roll call of alumni is expected to be completed by Thursday, May 27, and each Thursday during the four-week period between April 29 and May 27 a report meeting on the progress of the Fund will be held.

To maintain the "living endowment" of more than a million dollars which they have created, the alumni will have to equal last year's contributions of $50,368.75 in this period.

The Alumni Fund is important because it represents the first co-operative project of the alumni of Armour, the alumni of Lewis and the alumni of Illinois Institute of Technology, the college formed by the merger of the schools of the first two groups. Last year, in its first year, the Fund united these groups in common allegiance to their alma mater—and now with the bonds well established even greater things are to be hoped for.

In creating the first annual Alumni Fund, the alumni of Illinois Institute of Technology joined the alumni of more than two hundred colleges and universities—including Stevens, Harvard, Columbia, Chicago, Northwestern, Oberlin, Wellesley, Radcliffe and many other well-endowed schools—in making plans for the continuous support of their Alma Mater in the form of such a fund.

The first alumni fund dates back to 1890. It was created by the alumni of Yale University. The idea back of this new activity, as stated by the Yale Alumni Association, was as follows:

"The establishment of the Yale Alumni Fund in 1890 was a recognition of the strong desire of every Yale man to serve. In the words of the founders, 'a widespread sentiment has existed for some time among Yale graduates in favor of some systematic endeavor to increase the resources of the University.' Until the Alumni Fund was organized, there was no practical way for the great mass of graduates to help the University, to give tangible evidence of their loyalty and to have a share in making possible for others the benefits which they themselves had enjoyed."

It was this same spirit that prompted the establishment of the first annual Alumni Fund of Illinois Institute of Technology. Then too the alumni of Illinois Tech had the added incentive of the opportunity to assist in the development program of Illinois Institute of Technology which proposes to make of their school a technological center second to none.

Proof of the sincerity of the spirit of the alumni in establishing the first annual Alumni Fund can best be seen in the results—in the "living endowment" of more than a million dollars.

What is a "living endowment"?

It is the yearly support of loyal alumni stated in terms of an endowment. For example—the $50,368.75 contributed by the Illinois Tech alumni in the first annual Fund is equivalent to a yield of four per cent from an endowment fund of $1,259,219.75. Thus it is a "living endowment" of more than a million dollars.

A total of 2670 alumni made possible the first annual Alumni Fund.

Of the amount they contributed, $36,395.75 was designated for Illinois Tech's development program. The remainder was set aside for the Carman Memorial Library and the field house, the two particular objectives of last year's fund, $3,484 being for the library and $10,489 for the field house.

The money contributed to the Carman Memorial Library Fund and that to the Field House Fund has been banked and will be held until such time as it will be possible to construct the library and the field house.

The Field House Fund has now grown to more than $20,000. In addition to the gifts through the first annual Alumni Fund, others have been received from the students. A Field House Fund was established by the Illinois Tech Student Association, representing $10,000 of accumulated reserves of student activity funds for past years. The 1943 senior class at Illinois Tech contributed $225 in war bonds to the fund.

A complete summary of the first annual Alumni Fund was made in a report covering the year ending Aug. 3, 1942.

The fund report, in its geographical division, showed that $12,402.50 had been contributed by 505 alumni in the national division.

Alumni in the Loop in Chicago contributed $8,026.50. The remainder of the city gave $11,298. Alumni in suburban areas gave $5,419.

The fund and the Founders' Roll, containing the names of all contributors and workers in the fund drive, were presented to President Henry T. Heald of Illinois Tech at the annual alumni meeting Dec. 9, 1942, by Adolph Fensholt, M.E. L'13, chairman of the drive.

President Heald, in thanks and acknowledgement, wrote Fensholt:

"To acknowledge the receipt of the first Illinois Tech Alumni Fund gift is one of the most pleasant tasks I have had since I have been president. This voluntary offering from over 2600 alumni is significant. It is a practical expression of the intelligent and loyal interest of our alumni. No institution can achieve its full usefulness without the continuous support of its alumni. To me, the first Alumni Fund is convincing evidence of that support."

This year through the second annual Alumni Fund Illinois Tech's alumni are again giving evidence of that support. They are doing it in much the same manner that they did last year.

Major objective of the 1943 fund is the building fund of Illinois Tech. Gifts will be used in helping to erect buildings on the new $3,100,000 campus, the first unit of which, the Metals and Minerals Research Building, was dedicated in January.

The two other objectives of the first annual Alumni Fund, the Carman Memorial Library and the Field House, are also retained, and alumni who wish to may designate their gifts for either of these projects.

Activity in the second annual Alumni Fund, as aforenoted, is already under way. Kent H. Parker, Fire Protection Engineering graduate of 1929 and assistant manager of the Western Actuarial Bureau in Chicago, is the chairman of the second annual Fund.

P. O. Ridings.

PLACEMENT DEPARTMENT

HELP! HELP! HELP!

By

JOHN J. SCHOMMER

Most of the members of the 1943 class of engineers took their degrees in February, 1943. (The seniors finished a semester this past summer.) Others will finish in May and perhaps a few will finish later on if the armed forces do not requisition them. Approximately thirty-five percent of the class at the last tabulation, had entered the armed services.

Those who enlisted as soldiers of production probably received as a class the highest initial starting salaries for a basic forty-hour working week in the history of the college. Hereinafter are the data concerning the 1943 February graduating class of engineers who are all at work:

	Initial Average Monthly Salary
Mechanical Engineers	$167.41
Chemical Engineers	166.83
Electrical Engineers	176.37
Fire Protection Engineers	194.10
Industrial Engineers	157.44
Architectural Engineers	174.19
Civil Engineers	174.27

The average monthly salary, based on a forty-hour week, was $169.83. The Mechanical Engineering Coops are not included; their salaries are considerably higher on account of their actual work experience. Salaries of men in the armed services, enlisted or commissioned, are also omitted. The average initial monthly salary for other years is given here for comparison, computed on a basic forty-hour week:

Class of	Salary
1938	$100.00
1939	110.82
1940	119.20
1941	139.95
1942	152.60

So another class has come and gone. They came as undergraduates; they are now alumni. God speed them and "Happy Landing" to all of them!

The demand for engineers is great and urgent. Many industries are crying for engineers. Wanted are production men, men with designing ability, time and motion experts, tool, die and jig designers, aeronautical engineers, research engineers, and so it goes. The placement office has been and is flooded with notices of 1 A's, appeals turned down and induction notices for students, faculty and alumni. Engineers are going in the armed services. Many young engineers in industry are being drafted. Older men are applying for commissions. If legislation is not passed quickly to assure a source of supply of engineers for industry, production will lag.

The Army and Navy are taking care of themselves. The armed services' engineering students will be housed, fed and in uniform and paid $50.00 a month while attending classes at designated colleges. Those students receiving passing grades in periodic tests will be retained until the completition of their studies. Those failing will be called for service.

Industries had better band together and look out for the country's interest by some concentrated action demanding a source of supply. Under the new Activity and Occupational Bulletin No. 33-6, those students who are in college now and who will graduate on or before July 1, 1945, under the accelerated program, may be deferred. Those entering this summer will not be deferred. This means that the supply is cut off at the source. Since they cannot graduate by July 1, 1945, the Selective Service System will induct these students. Of course, if the war is over by 1945, this picture will change.

The Bureau of Naval Personnel is in search of and has urgent need for men who have the following qualifications:

1. College degree, with a good scholastic record and active and effective participation in extracurricular activities.
2. At least five years experience in teaching or in teaching and administration, particularly in mathematics, physics, engineering, and related sciences or foreign languages, especially French and Spanish. (It is preferred that this experience has been gained in the larger towns and cities, but the applicant will be considered if from a smaller community and qualifications are otherwise strong.) Experience in other vocations, such as sales management and sales promotion, or in similar fields will qualify.
3. Proved ability to plan, organize, and administer in fields requiring above described experience.
4. Age—twenty-six to forty-one.

Since they are to be officers in the United States Naval Reserve, the candidates should have forceful personality, tact, good appearance and pronounced qualities of leadership.

If you are interested, write this office and we will direct you for interviews.

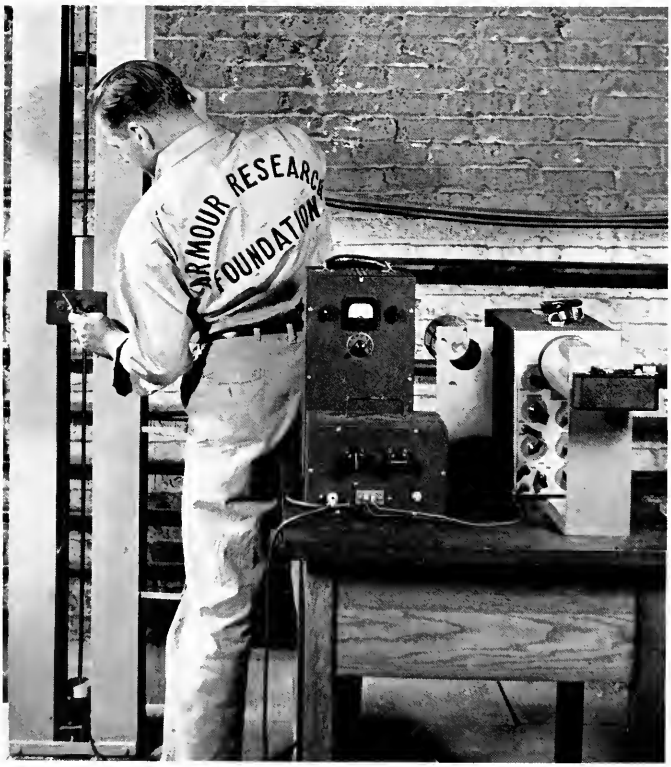
The War Manpower Commission insists that there is a critical shortage of sanitary engineers, as if there weren't a critical shortage of all engineers. We need sanitary engineers and must have them in the armed services for camps, occupied cities, and for civilian needs. So they are needed most urgently for military, semi-military and civilian purposes. Therefore, as a most patriotic duty please send in your name to this office, if you have had any experience as a sanitary engineer. If you know of any of our alumni who can qualify, send their names to this office.

If out of a job, if quitting a non-defense job, if you want a commission in the armed service, write this office. Maybe we can help you. To make us of service to you and to save delay be sure you have your record on our placement sheet in our office.

BETTER MOUSE TRAPS

The resistance-type electrical strain gage is one of the outstanding tools in the field of stress analysis. To utilize the strain gage to the fullest extent it is necessary to design the associated equipment for the specific application. This calls for the combined efforts of the electronic physicist and the engineer. A complete laboratory for the design and construction of electronic equipment for use in determining stress distribution has been established at the Armour Research Foundation, and has already contributed several instrumental techniques to the scientific progress in this field.

The properties of the resistance type of gages which have contributed to their rapid growth in popularity are numerous. They are low priced compared to delicate mechanical gages of similar sensitivity, and for this reason it is desirable to use the resistance units in applications where gages might be damaged or destroyed through rough treatment. The remote indicating feature makes it possible to test such things as pressure vessels without serious danger to the operator. In addition to this it is possible to take simultaneous readings of the strain in various parts of a large structure.



Impact measurement using resistance-type electric strain gages with special high-speed recording instrument.

For the most part, the strain sensitivity of the gages is limited only by the degree of amplification used; hence they are quite practical for measuring elongations or compressions of the order of two millionths of an inch per inch. This degree of sensitivity is greater than that of ordinary mechanical strain gages. The gage length may be as small as one-eighth inch, permitting use on relatively small machine parts without serious errors in readings.

Extremely light themselves, resistance-type gages may be used for recording rapid transients without changing the shape of the strain-time curve. The point of measurement is close to the surface of the member, and this is significant if some bending is present. The gages are easily applied to the member, whereas certain mechanical gages require magnetic devices to clamp them to the member. The units are commercially available and are supplied with a strain sensitivity factor which is accurate to one percent. Armour Research Foundation studies find that the gages run very uniform in any given batch, and it is necessary to calibrate only one gage in each batch.

The simplicity of construction of these gages is rather surprising when compared with mechanical gages of high sensitivity. The basic element of the gage consists of a grid of fine alloy wires cemented to a layer of paper which in turn is cemented to the member to be tested. Any change in stress in the member will change the resistance of the strain gage. The choice of the alloy wire for the gages depends on the relative importance of temperature and sensitivity. For static strain measurements Advance wire can be used to keep the effect of temperature at a minimum. For dynamic work the effect of temperature is less serious, and a wire having a greater change in resistance with tension may be used. The cement used in the manufacture of the standard gages is not suitable for use at high temperatures; so special gages using phenolic cements must be used for work in high-temperature applications such as internal-combustion engine studies.

The best type of circuit to use in pure static loading studies is a simple wheatstone bridge circuit with a sensitive galvanometer. The changes to be measured are very small; so special forms of bridge must be used. The adjustment of the bridge is accomplished by the use of variable resistance decades shunted across the bridge arms. This shunted connection is

(Turn to page 52)

SPEE MEETING

When the Society for the Promotion of Engineering Education returns to Chicago, the city of its birth, in June for its Golden Anniversary Convention, it will mark the fourth time that the Society has met in Chicago.

And it is fitting that Illinois Institute of Technology will be one of the co-hosts to this Golden Anniversary convention, for like the Society itself, Illinois Tech's Armour College of Engineering was founded in 1893.

The Society for the Promotion of Engineering Education was the outgrowth of Division E of the World's Engineering Congress held in Chicago from July 31 to August 5, 1893, in connection with the World's Columbian Exposition. While the plans were under consideration for the congress, Prof. Ira O. Baker of the civil engineering department of the University of Illinois suggested to Judge C. C. Bonny, president of the Congress Auxiliary, the desirability of arranging for a meeting of teachers of engineers.

This meeting was arranged under the direction of Prof. Baker. The attendance of 158 was a surprise, and the interest created resulted in the formation of the Society.

Prof. DeVolson Wood of the department of mechanical engineering of Stevens Institute of Technology, Hoboken, N. J., then the senior teacher of engineering in the nation, and now deceased, was elected president.

Since this original meeting held here in 1893, the Society has returned to Chicago for conventions in 1918 (Evanston) and in 1933. And in 1922 also the group met in Illinois, holding the convention in Urbana.

This year's convention will be one of the most important in history, as it will seek to solve the engineering education problem of a nation at war. The program will be devoted exclusively to the discussion of topics relative to the place of engineering colleges and engineering education in the world.

President Henry T. Heald of Illinois Tech heads the Society at this crucial period. He will arrange for the meeting and will direct the general program. Only thirty-eight years old, Heald is the youngest national president in the history of the Society.

Under President Heald's leadership, the Society recently filed an application for a charter in Pennsylvania. The charter will incorporate the organization as a non-profit, educational group.

The objects of the Society, as stated in its constitution, are "the promotion of the highest ideals in the conduct of engineering education with respect to administration, curriculum, teaching work, and the maintenance of a high professional standard among its members."

Means by which this goal is to be obtained, as also listed in the constitution, are "educational research, the holding of meetings for the reading and the discussion of professional papers, and the publication of papers, discussion and communications."

Illinois and its citizens have figured prominently in the history of the Society. As aforenoted, the original idea for the Society was conceived by an Illinoisan, and four conventions have met in Illinois.

President Heald of Illinois Tech is the fourth Illinoisan to serve as president.

After serving as chairman at the first meeting, Prof. Baker was elected president in 1899. One of his fellow professors of engineering at the University of Illinois, Arthur N. Talbot, was elected president in 1910. And another Chicagoan, John F. Hayford of Northwestern University, served as president in 1917-18.

Only one president, C. F. Scott of Yale University, has ever been reelected. Prof. Scott headed the Society for two terms, 1921-22 and 1922-23.

In addition to its national conventions, the Society also sponsors sectional meetings. Its activities are subdivided to include every important division of engineering and engineering education.

The Society issues a monthly publication, the Journal of Engineering Education. Proceedings of the convention are published in the Journal.

The coming convention in Chicago will be held on Thursday, Friday and Saturday, June 18, 19 and 20. It is expected by officials in charge that from 500 to 750 will be in attendance. Serving as co-host for the convention with Illinois Tech is Northwestern University.

Convention arrangements will be handled by joint committees of the two schools. Chairmen of these committees are:

Anniversary: Walter Hendricks, Illinois Tech.

Annual Dinner: L. T. Wyly, Northwestern.

Budget and Finance: R. J. Spaeth of Illinois Tech and E. F. Oberg, Northwestern, co-chairmen.

Conferences: C. O. Harris, Illinois Tech.

General Sessions: B. H. Jennings, Northwestern.

Group Meals: W. E. Brinker, Northwestern.

Printing and Publicity: Paul O. Ridings, Illinois Tech, and R. W. Jones, Northwestern.

Registration: J. B. Finnegan, Illinois Tech.

General co-chairmen in charge of convention arrangements are R. C. Kintner of Illinois Tech and C. E. Watson of Northwestern.

P. O. Ridings.

THE SCHOOLMASTER

Whisper your grief to your saddle-bow, and ride forth singing.

King Alfred wrote that a thousand years ago. When I read it, on a dull day last fall, when the news from the battle fronts was not good,—when I learned of the death of another of our boys in action,—when the routine of some unpleasant tasks was irksome,—when major and minor problems seemed abnormally difficult to solve, I bought me a horse.

He was a little horse, of silver bronze. Obviously a thoroughbred. Beautiful in form and proud in stance. Saddled and bridled, ready for a rider who may have griefs to be whispered but who must have songs to be sung. On a desk loaded with work to be done, Alfred's horse and the quotation that he brings to mind suggest the reticence, the courage, and the buoyancy of his royal master.

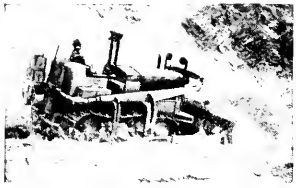
Millions of our boys are in uniform. They have given up their homes, their normal work; they may give up their lives. A column of sailors passed me last week. They were singing.

More millions of us are at home and will remain there,—some because of age or physical inability to pass the tests which choose our fighting men, some because their duties behind the front must be carried on as a part of the total war, many more who are the mothers, sisters, wives, or sweethearts of those who go out to battle for us. We stay-at-homes have griefs. I do not speak of the trivial things, the minor inconveniences. Annoying they may be. "Grief" is a word that de-

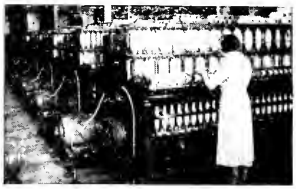
(Turn to page 52)

PUMPING LEAD...

Night Fighter in Action! Allis-Chalmers equipment is helping the U.S.A. build and arm 185,000 planes in two years!



A-C Tractors and Bulldozers help build roads and air fields.



Allis-Chalmers equipment helps make cloth for Army and Navy.

Metal for Bullets, Machine Guns, Planes...Water Sup for Cities—flow from Allis-Chalmers Equipment!

BULLET LEAD for Night Fighters is mined and refined with the help of Allis-Chalmers equipment.

So is *steel* for guns—*aluminum* for wings!

And great pumps which deliver tons of precious water to America's cities are also among the *1,600 Allis-Chalmers products.*

The thousands of Allis-Chalmers employees in 8 great plants are proud that their effort aids production in *every* major U.S. industry.

And in 65 cities Allis-Chalmers engineers are on call to help you produce *more*—not just with new machines, but with machines *now on hand!*

ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

New Allis-Chalmers turbines a U.S. Industry's growing power.

ALLIS-CH

OFFERS EVERY MANUFACTURER EQUIPMENT AND ENGINEERI

ELECTRICAL

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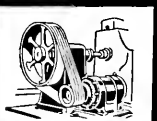

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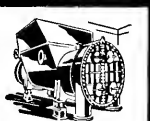

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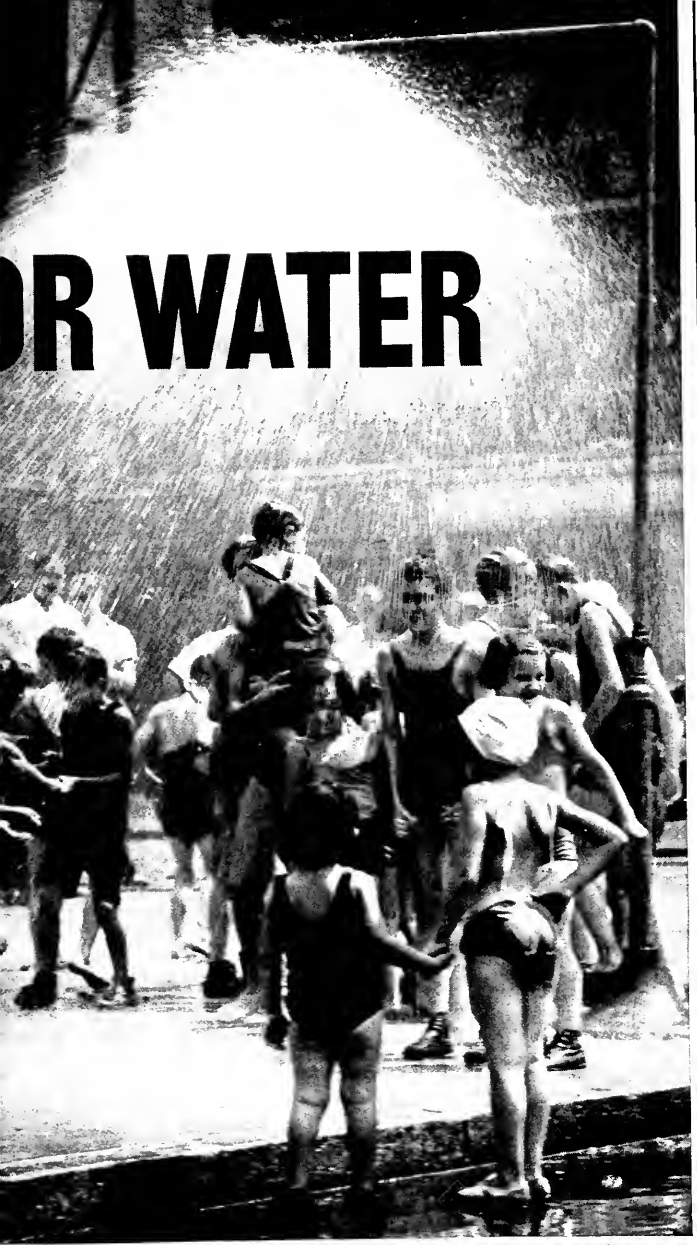
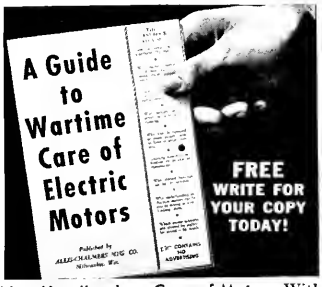


'ater for Millions! Allis-Chalmers pumps help keep many of America's cities alive.

VICTORY NEWS

A New Fleet of Tugs is being built for the U. S. Navy. Their principle duty is long towing of disabled vessels in rough seas.

The most powerful of their kind in the world, most of the tugs will be driven by Allis-Chalmers electrical propulsion equipment. Their electrical equipment includes Allis-Chalmers motors, generators and control.



New Handbook on Care of Motors. With motors operating 168 hours a week instead of 40 hours as formerly, most books on motor care are seriously out-of-date.

A new handbook entitled "A Guide to Wartime Care of Electric Motors" has just been published by Allis-Chalmers. It takes a new slant at motor care and is of great value to war plant engineers and maintenance men, and particularly for training new men. *The book contains no advertising, and is available upon request.*

Rush A-C Tractors to World Battlefields. Thousands of gun-pulling Allis-Chalmers track-type tractors will soon see action in Russian and U.S. Forces overseas. These tractors differ from Allis-Chalmers regular commercial models only in additional equipment carried. The army version of this tractor is also speeded up somewhat over the commercial model.

FOR VICTORY
Buy United States War Bonds

ALMERS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

ATION TO HELP INCREASE PRODUCTION IN THESE FIELDS...


UR AND SAW


CHEMICAL PROCESS


CRUSHING, CEMENT &


BOILER FEED


POWER FARMING


INDUSTRIAL TRACTORS

FROM YEAR TO YEAR

A RECORD OF OUR ALUMNI AROUND THE WORLD

MEN OF THE MONTH

BAILEY

Moffet Studio

Known as "Alex" by his host of friends among Illinois Tech alumni and among the employees of Commonwealth Edison Company which he has served so ably and faithfully since December 1, 1903, Mr. Alexander D. Bailey, Vice-Chairman of the Board of Trustees of Illinois Institute of Technology, was born in Salem, Kenosha County, Wisconsin on February 14, 1882.

When he was seven years old, his parents moved to Chicago's great West Side where he attended the public schools. He later spent four years at the Glen Ellyn, Illinois, high school and was graduated in 1897.

He was very active as a student at Lewis Institute, having been, during his undergraduate days, president of the Parnassian Society, president of the Allen C. Lewis Society, and president of the Boys' Glee Club. He was a member of the cast of the play, "Cricket on the Hearth," which was given in the Lewis auditorium in December, 1902. At this commencement in 1903, when the degree of Mechanical Engineer was conferred upon him, he delivered an oration entitled "The Tool and the Man."

Recognizing his ability as a teacher, the director of Lewis Institute retained him on the faculty as an instructor in the night school for five years after his graduation.

He entered the employ of Commonwealth Edison Company in 1903 as an assistant to the chief engineer at the Harrison Street Generating Station. In November, 1905, Commonwealth Edison Company transferred Bailey to the drafting room of the engineering department, and in September, 1906, he was made assistant to the chief engineer of the Fisk Street generating station. January 1, 1910, found him promoted to the position of assistant to the chief engineer of both Fisk and Quarry stations. On July 1, 1917, he became chief engineer of these two stations. He was made superintendent of generating stations on January 1, 1921, and on July 1, 1933, he took on the additional duties of assistant to the chief operating engineer. October 1, 1934, he was assigned full-time assistant chief operating engineer and continued in this position until January 1, 1936, when he was elevated to chief operating engineer. At this time his jurisdiction was extended to cover the generating stations, the sub-station department, and the load dispatcher's office. January 1, 1943, Mr. Bailey was appointed to his present position of assistant to the vice-president in charge of operating and engineering. In this capacity he assists Vice-President H. B. Gear in the administration of several departments, and, in addition, has immediate supervision of Powerton Generating Station, Pekin, Illinois, and its related transmission system.

WISHNICK

Kaiden Kazanjian Photo

His cordial personality and keen sense of humor and willingness to counsel and help beginning engineers to get a better understanding of the responsibilities of their profession are qualities admired by his professional and personal associates.

That he is a recognized authority in engineering is evidenced by the fact that at the dedication ceremony of the Technological Institute of Northwestern University he was awarded the honorary degree of Doctor of Science.

Many other honors have been conferred on him by professional societies.

Mr. Bailey has been a director of the Union League Club of Chicago; vice-president and senior counselor of the American Society of Mechanical Engineers; chairman of several committees in the National Electric Light Association, Edison Electric Institute, and Association of Edison Illuminating Companies; and director of the Utilities Research Commission.

He also holds membership in the Western Society of Engineers; Tau Beta Pi; La Grange Country Club; and the La Grange Civic Club.

For fourteen years he served the village of La Grange, where he makes his home, as village trustee—serving the last two years as president of the board.

At most engineering schools St. Patrick's day is celebrated, as St. Patrick is considered the patron saint of the engineers (he made the first "worm-drive"). Four years ago Mr. Bailey was made a Knight of St. Patrick, Summa Cum Laude, by the engineering students of the University of Missouri.

He is the co-inventor of "over-fire air injection" and author of numerous articles published in the technical press.

His service to his Alma Mater has been very extensive. He has held several offices on Institute and alumni bodies. He was president of the Board of Trustees of Lewis Institute and he is now vice-chairman of the Illinois Tech Board of Trustees.

Mr. Bailey, an Episcopalian, resides at 114 South Kensington Avenue, La Grange, Illinois, with his wife, Amelia. They have four children, all of whom are married; a son and a son-in-law are officers in the Army Ordnance and Medical Corps, respectively.

HOWARD A. CARTER.

ROBERT I. WISHNICK

From immigrant boy to manufacturing chemist and philanthropist, that is the saga of Robert I. Wishnick, a 1914 graduate of the Department of Chemical Engineering at Armour and a deserving nominee for one of the ENGINEER's men of the month.

Always a loyal supporter of his alma mater, Mr. Wishnick was made a trustee of Armour Institute of Technology a number of years ago, and since the establishment of Illinois Institute of Technology, he has been a member of its Board of Trustees.

In his chosen profession, Wishnick has been notably successful. After graduation from Armour, he sought employment in chemical industry and worked for a number of concerns until in 1920 he organized Wishnick-Tumpeer, Inc., for the manufacture and distribution of pigments and general chemical products. This firm, in which Wishnick has remained as president, has enjoyed a prosperous growth, and now operates plants at Lawrenceville, Illinois, and a factory and research laboratory at Chicago, and maintains offices in New York, Chicago, Cleveland, and Boston, and in London, England. Wishnick is also president of several other manufacturing concerns including Continental Carbon Company and Crown Carbon Company, both at Sun Ray, Texas, and Panhandle Carbon Company, at Borger, Texas.

When his parents emigrated from Russia to America in 1896, seeking new opportunties, Robert Wishnick was four years old and the youngest of eight children. The family settled in Chicago, and one of the "new opportunities" that came to this immigrant lad was that of an engineering education at Armour Institute, where he received a B.S. degree from the Department of Chemical Engineering. when he graduated with the Class of 1914. While working as a chemist in the daytime, he attended Chicago Kent College of Law at night and received a Bachelor of Law degree in 1917 from this school.

A few years after his graduation, Wishnick married Miss Freda Frankel, a native of Eagle River, Wisconsin, and a University of Wisconsin graduate who was then a teacher of high-school mathematics at Madison. The Wishnicks have three children, a daughter who is a Wellesley graduate and now married to Lt. Stanley Freedman, U.S.N.R., serving as a malariologist in the South Pacific area, and two sons, one eighteen and the other twenty years old, both of whom are now in training as aviation cadets in the Army Air Corps.

In addition to the service his children are lending to the war effort, Wishnick is himself making a real contribution through the work of his research laboratories and factories which are geared to war production. Of particular interest is the fact that Wishnick-Tumpeer, Inc. is a leader in research and development work on the compounding of synthetic rubber products. Also of vital importance are rubber compounding ingredients, certain asphalt specialties being manufactured for use in munitions containers, and the production of carbon black for use in compounding synthetic and natural rubber here as well as for shipment to the Allied nations under "lend-lease."

Among his philanthropies besides his liberal contribution first to Armour Tech and then to Illinois Tech, Wishnick serves as trustee in the orphanage division of New York Federated Charities, and is also a trustee in Agro-Joint, an organiaztion for the settlement of war refugees. His business and social affiliations include membership in the American Institute of Chemical Engineers, American Institute of Chemists, American Chemical Society, Chemists' Club of New York, Standard Club of Chicago, and the Old Oaks Country Club, Purchase, New York. He is also a trustee of Temple Israel, at New Rochelle, New York, the city where he now resides.

Side by side with his intense capacity for work, Wishnick has an extremely engaging personality and a love of his fellow man which makes it only natural that his energies should find an outlet in charitable and educational activities in addition to his profession.

JOHN HOMMES.

1898

NAGELSTOCK, EDWIN H., E.E. A., recently received the following interesting write-up in the Fremont, Nebraska, Guide:

OREGON'S VOYAGE TO SCRAP PILE EXCITES MEMORIES

The recent trip of the battleship Oregon, historic "bulldog of the Navy," to war via the scrap pile was of special interest to Ed Nagelstock of 435 E. 5th, Fremont, Nebraska, veteran of the Spanish-American war. Nagelstock served on the Oregon as a searchlight operator in the famous battle of Santiago on Sunday, July 3, 1898, when the American force smashed the Spanish fleet under Admiral Cervera. The battle, which was completed fairly early the afternoon of the same day, is considered one of the decisive ones of world history. The last voyage of the Oregon to the scrap pile was a forty-mile cruise down the Columbia River to Kalama, Washington, where metal workers will reduce the battlewagon to ten thousand tons of high-grade scrap steel for new ships of war.

1900

HARVEY, DEAN, E.E. A., who is materials engineer with the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania, is spending three days per week with the Conservation Division, WPB, 8th Floor, Washington Gas Light Building, 1100 H Street N.W., Washington, D. C. His home address is 109 Dewey Avenue, Edgewood, Pittsburgh, Pennsylvania.

1904

WELCH, SUSIE E., A.A. L., now resides at 305 N. Menard Avenue, Chicago, Illinois.

1905

COTTER, WILLIAM E., Ac. L., has moved from 214 S. Oak Park Avenue to 317 Home Avenue, Oak Park, Illinois.

1906

KEMNITZ, ERNEST, Ac. L. New address is 4247 Lincoln Avenue, Chicago, Illinois.

1907

HAGGANDER, GUSTAVE A., C.E. A., who was assistant chief engineer of the lines east of the Missouri River of the Chicago, Burlington & Quincy Railroad, has been promoted to assistant chief engineer of the Burlington Lines (including the Chicago, Burlington & Quincy, the Colorado & Southern, the Fort Worth & Denver City, and the Wichita Valley), with headquarters at 547 W. Jackson Boulevard, Chicago, Illinois. He resides at 62 Malden Avenue, La Grange, Illinois.

1909

HARGER, CHARLES K., C.E. A., has recently moved from Chicago to 401 Moore Street, Ottawa, Illinois.

1910

BEACHY, WALTER F., Ac. I., now lives in Canoga Park, California, at 22327 Oxnard Street.

1911

MARX, CHARLES, H., C.E. A., now resides at 417 Cloverly, Grosse Pointe Farms, Michigan.

1912

EDWARDS, LESTER R., M.E. L., was recently appointed president of Bradford Publications Inc., Bradford, Pennsylvania. He is a native of La Crosse, Wisconsin, and was educated in the public schools of Elkhorn, Wisconsin, and the Lewis Division of Illinois Institute of Technology, from which he was graduated in 1912 with an M.E. degree.

While in college he was business manager of the Year Book for two years and in his senior year served as editor. Following his graduation he became affiliated with The Aeroshade Company of Waukesha, Wisconsin. He was sales manager when he left to enter the Armed Services.

During World War I, Mr. Edwards enlisted in the United States Navy. He saw service overseas and left the Navy with the rank of ensign.

After the war, he entered the food canning industry and was successively manager of a vegetable canning plant at Janesville, Wisconsin, and president of the Garden Canning Company and the Harry Fairview Farms Company of Evansville, Wisconsin. These enterprises were consolidated with the Columbus Food Corporation of Columbus, Wisconsin, with plants at Columbus, Juneau, Horicon, and Evansville, Wisconsin; Shelbyville, Indiana; Lawrence, Kansas; and McAllen, Texas. Mr. Edwards is a director of this corporation as well as a director of the Whitewater Canning Company, Whitewater, Wisconsin, and of the Humbird Canning Company, Humbird, Wisconsin.

In 1925 he joined the Kieckhefer Container Company at Milwaukee, Wisconsin, an assistant to the president, director and secretary-treasurer. He became secretary and treasurer of the Kieckhefer Container Corporation of Delair, New Jersey; the Charles A. Fox Box Company of New York; the Eddy Paper Corporation; and the Quick Service Box Company of Chicago. In January, 1935 he was instrumental in forming and locating in Bradford, Pennsylvania, the Northeastern Container Corporation. This company started with twenty-five employees and now normally employs two hundred. Mr. Edwards owns a home in Hedgehog Road, Bradford, Pennsylvania, where he resides with his wife and four daughters.

1913

AGEE, ROBERT E., F.P.E. A., now resides at 2037 W. Fargo Avenue, Chicago, Illinois.

BADGER, HENRY S., E.E. L., has moved from Maywood to 31 W. Harrison Street, Lombard, Illinois.

FRYBURG, WARREN F., E.E. A., who was sales manager for The Black & Decker Electric Company, Kent, Ohio, has been appointed a director and vice-president of that company. He is a recognized authority on the many specialized uses for fractional horsepower electric motors, and has had seventeen years technical and marketing experience in that field. His home address is 2216 Kerrwood Road, Cleveland Heights, Ohio.

1914

BURNHAM, COLONEL CLIFFORD L., M.E. A., writes that he is the first Illinois Tech alumnus to be graduated from the School of Military Government, United States Army, at University of Virginia, Charlottesville, Virginia. He resides at 8 Oakhurst Circle, Charlottesville, Virginia.

1920

WAIN, URHO, A.A. L., writes that his mailing address is Fanwood, New Jersey, and that of Adolph Kuellmar, also A.A. L. and M.E. A'22, is 6905 N. Sheridan Road, Chicago, Illinois.

1922

MASTERS, CAPTAIN HARDIN W., M.E. A., now in the Air Corps, A.A.F.T.T.C., writes from Sioux Falls, South Dakota:

I have greatly enjoyed reading the Technometer and Engineer and Alumnus. It is splendid that all of the old alumni have the opportunity, thru these publications, of keeping in touch with the school and each other. Have been on duty with the Technical Training Command of the Army Air Forces since last June. Much of the administrative work makes desirable a knowledge of some of the basic courses taken at Armour twenty-five years ago. This is certainly a war of the technicians insofar as vocational training is concerned. Illinois Institute is again playing its part with distinction.

Keep up the good work.

Sincerely,
(Signed) HARDIN W. MASTERS,
Captain Masters resides at 2115 S. Phillips Avenue, Sioux Falls, South Dakota.

1923

HESS, FREDERICK A., C.E. A., has been appointed assistant general manager of the Indiana Harbor Belt Railroad Company, Chicago Junction Railway, and The Chicago River & Indiana Railroad Company. His business address is 837 W. Exchange Avenue, Chicago, Illinois, and his residence is at 1297 Walnut Avenue, Des Plaines, Illinois.

PIETY, LIEUTENANT HAROLD H., E.E. A., has been in the Navy since August, 1942. Indoctrination training (officers' boot camp) was given Mr. Piety at the USNR Midshipman's ship "New York," which is located at Columbia University. The course there consisted of eight weeks intensive training. Upon his completion of the indoctrination course, Lieutenant Piety was stationed with the Training Division of the Bureau of Naval Personnel at Washington, D. C. On February 20, 1943 he was transferred to the Naval Training School (Electrical), University of Minnesota, Minneapolis, Minnesota, and made executive officer.

1926

TREFF, WALTER R., A. A., has changed his mailing address to P. O. Box 1740, Milwaukee, Wisconsin.

1927

FLEISCHER, LT. COL. JOSEPH, E.E. A., is with QMC Headquarters 512th QM Truck Regiment.

MARTENS, LE ROY P., C.E. A., is a Captain with the Medical Detachment at Selman Field, Monroe, Louisiana.

1928

KELLY, ALOYSIUS W., F.P.E. A., who has been with the Tennessee Inspection Bureau, Johnson City, Tennessee, for the past fifteen years, has joined the staff of Bennett & Edwards, Kingsport, Tennessee, as fire prevention engineer.

1929

HANSEN, ARTHUR B., M.E. A., is now living in Park Ridge, Illinois, at 12 Grace Street.

1930

CLARK, MAYNARD E., C.E. A., wrote the following letter to the Alumni Office:

I am on your service list as "M/Sgt. M. E. Clark, Chief Clerk, G-3 Section, Hq. 89th Inf. Division, Camp Carson, Colorado." The following new address will be only for about the next two weeks, and I do not know what the assignment will be after that, but will let you know as I do not want to miss any of your publications.

Spent three months at Fort Belvoir, at the Officers School, assigned here for temporary duty and more instruction and expect a permanent assignment in a couple of weeks —probably utilities.

Best of luck to the school, and especially to all the Service men.

Sincerely,
(Signed) LT. M. E. CLARK,
1120 Huntington Bank Building
Columbus, Ohio.

YAP, DR. DIOSDADO M., A.S. L., recently completed an extended lecture tour of the southern states. Since his write-up as Man of the Month in the March issue of the Engineer and Alumnus he has been honored with membership in the National Press Club, International Lyceum Association, and the American Platform Guild, Incorporated. At present he is a visiting professor in Political Science at Howard University, Washington, D. C.

1931

JENS, ARTHUR H., F.P.E. A., acted as chief recorder for the American Society of Mechanical Engineers at the War Production Clinic held at the Medinah Club, Chicago, March 11. Members of the Institute faculty serving on committees and division included H. L. Nachman, J. S. Kozacka, J. I. Yellott, and H. P. Dutton.

LINDQUIST, BERT S., C.E. A., has recently been promoted from lieutenant to lieutenant-commander, U. S. Navy.

BUTTROS, ARTHUR C., E.E. L., is a staff sergeant with the War Department, Civilian Protection School, University of Washington, Seattle, Washington.

1932

Word has come to the Alumni Office from Mrs. Niotis that DEMETRIUS J. NIOTIS, C.E. A'32, who went to Pearl Harbor with a group of engineers in 1942, is returning to the mainland. He will be at home at 3920 W. Potomac Avenue, Chicago, Illinois.

VECK, MILTON F., M.E. L., is Supervisor of the service engineering section of the Engineering Department, Airplane Division, of the Curtiss-Wright Corporation, Louisville, Kentucky.

1933

BARNETT, ORVILLE T., Ch.E. A., engineer of tests for Murex arcwelding electrodes, of Metal & Thermit Corporation, New York, has been made production engineer for both arcwelding and thermit welding divisions. In addition to his new duties, Mr. Barnett will continue to supervise quality control of welding electrode production at both Jersey City and East Chicago plants. Before joining Metal & Thermit Corporation, in 1940, he was connected with Black, Seville and Bryson of Oklahoma City, Oklahoma, where he was in charge of welding and shop inspection.

Mr. Barnett is a resident of Milburn, New Jersey, 16 Bedwell Terrace.

BOOINSON, HAROLD W., F.P.E. A., who has been connected with the Royal-Liverpool Insurance Groups of New York City, has been commissioned a lieutenant (j.g.) in the United States Naval Reserve. At present he is stationed at Fort Schuyler, The Bronx, New York.

HOFFMAN, WILLIAM C., M.E. A., is now a captain in the Army Air Corps, on foreign duty.

1934

BECKER, PETER M., M.E. L., is a lieutenant (j.g.) and his mailing address is Box ND-10, Fleet Post Office, Balboa, Canal Zone.

LARSON, JOHN A., E.E. A., is a lieutenant with the Signal Corps.

PILCH, MEIR, E.E. L., is employed as engineer with the Sunflower Ordnance Works, Lawrence, Kansas. He resides at 1421 Kentucky, Lawrence, Kansas.

ROBINETTE, WILLIS E., F.P.E. A., is now an ensign in the Navy, stationed at Norfolk, Virginia. His address is c/o District Security Office, Room 604 West Wing, Old Administration Building, 5th Naval Base, Norfolk, Virginia.

1935

ABRAMS, CAPTAIN BERNARD B., C.E. A. New address is 2930 N. Glebe Road, Arlington, Virginia.

COLLATZ, GUSTAV T., Ch.E. A., a Lieutenant in the U. S. Army, is at Carlisle Barracks, Pennsylvania.

MOORE, 2ND LIEUT. DANIEL E., E.E. A., writes he is on the Staff and Faculty of the Engineer School at Fort Belvoir, Virginia.

1936

ANDERSON, HARVEY W., A.S. L., wrote the Alumni Office that he is now living at 3 Island View Boulevard, Mimico, Ontario, Canada. He is the supervisor of installation for the National Engineering Company of 549 West Washington Boulevard, Chicago, Illinois.

BOTHWELL, ROBERT H., E.E. A., who was formerly the Protestant chaplain at Mather Field, California, was transferred under secret orders beyond the continental limits of the United States some time ago. His present address is: 1st Lt., AUS, 0441134, A.P.O. 3524, c/o Postmaster, Seattle, Washington.

FEINSTEIN, IRWIN K., A.S. L., is an ensign in the United States Naval Reserve. He still receives his mail at his residence address, 3348 Wilson Avenue, Chicago, Illinois.

RIEVES, MARSHALL, H., E.E. L., a lieutenant (j.g.) in the United States Naval Reserve, is located at Submarine Repair Unit, c/o Postmaster, San Diego, California.

SHAW, MORRIS, A.S. L., a former clerk in the U. S. Post Office, is now Corporal Morris Shaw.

1937

BURACK, BENJAMIN, A.S. L., has been promoted to the rank of lieutenant in the United States Army Air Corps.

Lieutenant JACK CHARLES STERN, C.E. A., former civil engineer for the Cook County Highway Commission, has been promoted to the rank of captain according to a news release from the Public Relations Office, Key Field, Mississippi. Captain Stern entered the service as an Aviation Cadet April 4, 1941. In January of 1942, he was commissioned and served successively at Will Rogers Field, Oklahoma; Portland, Oregon; and Savannah, Georgia. He came to Key Field in June, 1942. He has a brother, David Stern, serving in the Air Corps at Walla Walla, Washington.

WIEGMAN, GEORGE R., Ch.E. A., reported missing in action, has been found alive and well, although a prisoner of war, according to a letter received by the alumni office from his mother, Mrs. G. Wiegman.

Saved! Tons of tin!

For years telephone cables have been spliced in a very satisfactory way. But the solder joint contained 40 per cent war-vital tin.

So Bell System men devised a new type of joint which saves up to 80 per cent of the solder. A "Victory Joint" they called it.

The new technique has been adopted throughout the System with the result that 600,000 pounds of tin and an even greater amount of lead can be saved in a normal year's construction.

This is another example of the nation-wide cooperation of Bell System people in fulfilling their ideal —service to the nation in peace or war.

1938

Petterino, Nando J., C.E. I., writes that he is now a structural engineer for the Carbide & Carbon Chemical Corporation, Charleston, West Virginia. Before taking this position he was with the U.S.E.D. in Arkansas, building dams. His residence address is 1521 Jackson Street, Charleston, West Virginia.

Quayle, Vincent H., E.E. A., wrote the following "V" mail letter to the Alumni Office.

Just received some mail from you bearing a request from the P.O. Dept. to "Notify your correspondents of your correct address," hence this letter. My correct address is: CENSORED.

Please change your addressograph machine plates accordingly.

Can't tell you anything about my work over here. "Working with the R.A.F. in Great Britain." That's about all I can say.

Always appreciate any and all information regarding I.I.T.

Cheerio

(Signed) Lt. Vincent Quayle E. E.'38.

Smith, Harold L., M.E. I., a former tool room foreman for the Smith & Richardson Company, Geneva, Illinois, is now an aviation cadet in the United States Army. He may be reached at AAFTD, Massachusetts Institute of Technology, Cambridge, Massachusetts, Room 301, Wolcott Hall.

1939

Kester, Milton C., Ch.E. A., wrote the following letter to the Illinois Tech Engineer and Alumnus.

I have not been able to contact very many members of my class since I graduated in June 1939, my degree being in Chemical Engineering. Since graduation I have been employed by the West Pullman Works of the International Harvester Company which position I obtained through the splendid efforts of Mr. John Schommer and Mrs. Constance Carroll of the Placement Department. Of recent date I have been promoted from research metallurgical engineer to assistant chief metallurgist. On August 15, 1942, I married the former Miss Jeao London and have since this time made our home at 403 East 110th Street, Chicago. I have been studying toward my Masters Degree in metallurgy at Illinois Tech and also have been employed as an instructor in heat treatment by the ESMWT division of Illinois Institute for the past two years.

I would appreciate your publishing the general points of interest of this letter in one of the future issues of the Illinois Tech Engineer and Alumnus in hopes of keeping in contact with my class and Illinois Tech.

Thanking you for attending to my request,

Yours very truly,

(Signed) Milton C. Kester.

1940

Avgerenos, Harry G., Ch.E. A., is a private in the United States Army. He may be reached at Barracks, 2604, Camp McCoy, Wisconsin.

Dahl, Walter L., F.P.E. A., has been promoted from a private to a corporal in the United States Army Air Corps according to a letter received by the alumni office. He states that he greatly enjoys the issues of the *Engineer* and the *Technometer* and that the news of the Institute is always interesting to him. He may be reached at 627th TSS Bks. 1661, Truax Field, Madison, Wisconsin.

Fellouris, John H., C.E. A., is a first lieutenant in the United States Army.

Katan, Simon, A.S. I., has been transferred from Jefferson Barracks, Missouri to Chanute Field, Illinois.

Lease, Ben G., M.E. A., a naval aviation cadet, has been transferred to the Naval Air Training Center, Corpus Christi, Texas, after successful completion of the primary flight training course at the Naval Air Station at Glenview, Illinois. After passing the advanced flight training he will pin on his wings as a naval aviator and be commissioned an ensign in the Naval Reserve or a second lieutenant in the Marine Corps Reserve.

Lisanti, Michael, A.S. I., has been promoted from corporal to lieutenant in the United States Army and may be reached at Area 5, Pine Bluff Arsenal, Pine Bluff, Arkansas.

Parker, Harry H., M.E. I. A recent letter received by the alumni office, from his mother, Mrs. H. H. Parker reads as follows:

I would like to give the following information regarding my son, Harry H. Parker.

He was graduated on January 14, 1943 as an Army Air Corps pilot at Napier Field, Dothan, Alabama. He is now on detached service with the Pan American Airways in Miami, Florida.

You have had him listed as an aviation cadet. He is now Lieutenant Harry H. Parker.

Sincerely,

(signed) Mrs. H. H. Parker,
4859 North Talman Avenue
Chicago, Illinois.

Paul, Marvin S., A.S. I., is an ensign in the United States Naval Reserve. He is at the United States Naval Training School, University of Chicago.

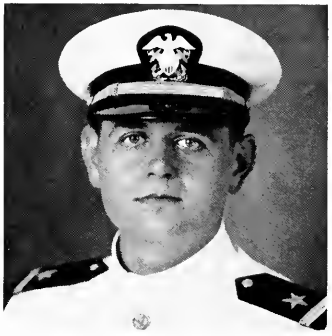
Rose, Sol S., A.S. I., a private in the United States Army may be reached at 8th Special Service Unit, A.P.O. 3566, c/o Postmaster, San Francisco, California.

Weber, Rupert J., Jr., C.E.A., a lieutenant in the United States Naval Reserve is at Bronson Field, Pensacola, Florida. He is now starting his twenty-first month as an instructor, and is instructing in carrier combat duty, dive bombing and gunnery.

1941

Appelt, Leonard, M.E. I., formerly with the Western Electric Company, Cicero, Illinois, is an ensign in the United States Naval Reserve. His mailing address is: Navy 1000, c/o Fleet Post Office, San Francisco, California.

Durkee, Charles E., E.E. I., an ensign in the United States Naval Reserve, may be reached at U.S.N.T.S. (Indoctrination), Room 669 Hollywood Beach Hotel, Hollywood, Florida.



DURKEE

Flaskamp, Paul K., A.S. I., a sergeant in the United States Army Air Corps, has recently changed his mailing address to Dale Mabry Field, Tallahassee, Florida.

Gregor, Jerome F., A.S. I., wrote this letter in answer to the letter from George Von Gehr, President of the Alumni Association.

To you sir, I am probably a stranger, since we have not had the occasion to meet. But deep down there is something that brings us together—the fact that we have an Alma Mater in common.

To say that I am an alumnus of I.I.T. means more to me every day. It does immediately give one a stepping stone toward the complete respect of one's fellow service men. I do owe so much to I.I.T. and its practical down-to-earth methods and policies. While serving in the personnel department of Revere Copper & Brass, Inc., prior to my entry into the armed services on December 5, 1941, I did feel confident of handling the problems that arose. The training to think in practical terms is responsible for this feeling of self assurance.

In the army, I am now serving as a musician which seems to be quite the need at present. I have been trained as a radio operator and have applied for officer's school but until headquarters see fit to transfer me, I shall remain here in the capacity of a trombonist.

In the band we have the responsibility of furnishing music for military formations and entertainment.

The experiences we have gained in the past year or so could not be purchased for money and make for a more complete and fascinating view of life and our American way of living. Those eligible civilians who plead for deferments know not why they are deferring themselves.

I will close this brief letter with the thought that you at I.I.T. are doing a grand job of training men for our future as well as our present demand. The news is appreciated and I do hope it will continue to come through. You will notice a new address which will be permanent in the near future.

Sincerely yours,

(signed) P.F.C. Jerome Gregor

Key, Eugene G., A.S. I., is now serving with the armed forces somewhere in England. His mailing address is: Lt. Eugene G. Key, A.S.N. 0-4787812, Electronics Training Group, A.P.O. 640, c/o Postmaster, New York City, New York.

Matthews, George J., E.E. I., was sworn in the Signal Corps of the United States Army December 7, 1942 and has been studying electronics at the University of Chicago. His course will last for about twenty weeks, after which time he will get his basic army training. He is allowed to return to his home every evening so that, for the present, his mailing address is 7222 Indiana Avenue, Chicago, Illinois.

Peterson, Richard A., M.E. I., a first lieutenant in the United States Army, is now serving as an engineer with the U. S. Army Air Corps in North Africa.

Salvado, Toribio D., A.S. I., writes that he is serving in the First Filipino Infantry, United States Army. This branch of the United States Army is still in the making and is purely a Filipino outfit. It is commanded by American and Filipino Officers. They are proud to say that they are training hard every day and are looking forward to the time when they will get even with the Japs.

SALVADO

Shapiro, Seymour K., Ch.E. I., recently wrote the Alumni Office as follows:

Since November 22, 1942 I've been an aviation cadet in engineering training. I had my primary basic training at the Valley Forge Military Academy, Wayne, Pennsylvania. From there I went to Chanute Field, Illinois, and I am now in the Cadet Advanced Training Command at Vale University.

I am an alumnus of Illinois Tech, being a Ch.E., graduated in 1941. At present I find this a very interesting program and I expect to get those gold bars in May. I was married to Miss Virginia Babbitt on August 8, 1942. My wife is at present residing in New Haven, Connecticut.

Sincerely,

(signed) A/C Seymour K. Shapiro
A.A.F.T.S.
Sterling Hall Rm. 2613 Entry "M"
Yale University
New Haven, Connecticut
Group 2

Stowell, H. Thurber, A.I., a former architectural draftsman with the Kraft Cheese Company, Chicago, is now a midshipman in the United States Naval Reserve. He may be reached at the U.S.N.R. Midshipmen's School, New York, New York, Furnald 307.

Strassenburg, Walter W., M.E. I., is a corporal in the United States Army.

1942

Benjamin, William R., A.S. I., a staff sergeant in the United States Army, is serving in the 40th Aberdeen Proving Grounds, Maryland.

Clears, G. T., E.E. I., wrote this interesting letter to the Alumni Office.

Having just received my copy of the *Technometer*, I am anxious to join the ranks of those Illinois Tech Alumni who are on record as being in the armed forces.

I received my commission November 14, 1942, and was sent to indoctrination school at the University of Arizona, Tucson, Arizona. After being there six weeks, I was sent to Boston to take a course at Harvard University in a specialized field of radio. I am now located at M.I.T. and am enjoying the work immensely.

My mailing address here is: 3 Sacramento Street, Cambridge, Massachusetts. Enclosed find small photo which I hope will fill the purpose for which it is desired.

I graduated, May 14, 1942 with a B.S. in E.E. degree. If I can be of any assistance to the association within my means, I will be more than glad to be so.

Very truly yours,

(signed) Gene T. Clears
Ensign, U.S.N.R.

"PERISCOPE ON THE STARBOARD QUARTER!"

IN SUBMARINE-infested waters, a speeding destroyer must be able to change its course in a split-second—to drop its deadly ashcans on enemy U-boats.

The secret of the destroyer's great *speed* and *maneuverability* is the tremendous power of its turbines, operating at steam temperatures *high enough to make the turbine blades glow!*

This introduces a difficult problem in turbine construction. The highly heated metal parts "creep" under stress. The metallic grains slowly slide over each other. The metal tends to *flow* out of shape.

Excessive "creep" would quickly destroy the turbine—due to collision between the blades and other parts of the turbine, which are spaced only a *fraction of an inch apart* for maximum power.

Westinghouse first introduced the steam turbine in the United States and has built thousands during the past 45 years.

And much of the success of Westinghouse steam turbines is due to the intensive studies of "creep"—similar to those conducted by Dr. A. Nadai, P. G. McVetty, and M. J. Manjoine, in the Westinghouse Research Laboratories.

As a result of this research, the "creep" in some turbine metals has been reduced to 1/10,000th of an inch per inch per year—less than 1/64th inch per inch in 100 years.

This has guided the development of metals capable of operating at greatly increased temperatures and speeds—and secured *more power per pound of turbine*, a vital necessity in a destroyer!

* * *

Research Engineer Manjoine, in collaboration with Dr. Nadai, is fighting a deadly battle against the submarine menace—by improving metals that make possible *faster, more maneuverable* ships for our Navy.

Manjoine is typical of the many young engineering graduates who are putting Westinghouse skill and "know how" to work for victory—and for a better kind of civilization when peace returns.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania.

Slower "creep" means faster ships—Research Engineer Manjoine studies "creep" of test samples to develop turbine metals that will deliver more horsepower per pound—making our destroyers speedier and deadlier. Manjoine received his B. S. from Iowa State College, before joining Westinghouse in 1937.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

CLEARS

Ely, Donald T., F.P.E. I., is in the Air Corps (Ground Crew) and receiving officers training at the present time. He may be reached until the first of May at A.A.F.T.S., Room 1736, Entry B, Silliman College, Yale University, New Haven, Connecticut. He is an aviation cadet.

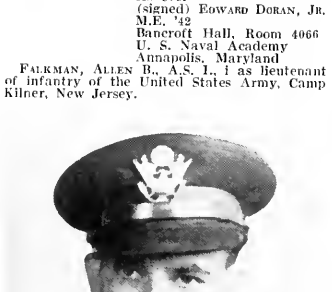
Doran, Edward, Jr., M.E. I., a midshipman in the United States Naval Reserve wrote the following letter to the Alumni Office:

Greetings from the heart of the Navy. Another alumnus finds himself in the ranks of the many now serving in the armed forces. I have just finished my month's indoctrination as a prospective reserve midshipman and am now referred to as "Reserve Midshipman Edward Doran, Jr., U.S.N." That's quite a mouthful for a fellow who before this never had a more high-sounding title than "senior Mech." For a month now we've had seamanship, infantry drill, gym and ordnance poured into us. The next three months it will be almost all steam, electrical and internal combustion engineering plus a little of warship construction and damage control. The physical training will continue right on also. At the end of the three months period I will be commissioned as an ensign (EVG), U.S.N.R. and sent out to join the fleet as an engineering officer of the line. That is, if all goes well. The old Armour background is pretty good. There are engineers from all over the country here and none have a better collegiate training.

Until some future day's reunion when we can all gather 'round the banquet table and describe our adventures.—"Anchors Aweigh."

As ever
(signed) Edward Doran, Jr.
M.E. '42
Bancroft Hall, Room 4066
U. S. Naval Academy
Annapolis, Maryland

Falkman, Allen B., A.S. I., is Lieutenant of infantry of the United States Army, Camp Kilner, New Jersey.



FALKMAN

Kamins, Alvin, M.E. I., was promoted from aviation cadet to lieutenant in the United States Army Air Corps. He may be reached at Hq. & Hq. Sq. 4th Bomb Wing, A.P.O. No. 634, c/o Postmaster, New York City, New York.

Koenig, Paul, M.E. I., an ensign in the United States Naval Reserve, may be reached at 612 North Washington Street, Portsmouth, Virginia.

Lasco, Henry A., E.E. I., has been flying B-24's for the past four months out on the West Coast. He has changed addresses every month, but has received his *Technometer* regularly.

Leskinen, Jorma I., E.E. I., received his commission as 2nd lieutenant in the United States Army Signal Corps on January 9, 1942. He had two months basic training at Harvard University. His mailing address is: U. S. Signal Corp.-ETG., Fort Monmouth, New Jersey.

1943

Geiger, Erwin J., M.E. I., is employed by the Dravo Corporation, according to a recent letter received by the Alumni Office. The letter read as follows:

I wish to notify you that Chester Binkowski, M.E. '43 and I are now living at 11th and Washington Sts., Wilmington, Delaware, Room 308, Y.M.C.A.

We are employed by the Dravo Corporation, now engaged in ship building, as Jr. Marine Engineers.

Please send all correspondence to the above address. Thank you kindly.

(signed) Erwin Geiger, M.E. '43

Rebak, John, Jr., E.E. I., has recently moved from Chicago, Illinois, to Washington, D. C. His new address is: 3232 "M" Street S.E., Washington, D. C.

1944

Asire, Donald H., Ch.E., I., left Illinois Tech with the Air Corps Reserve Corps and was sent to Fresno, California, for basic training. His present address is: Pvt. Donald Asire, 805 Tr. Group, Flt. 71A, Barr. 179, A.A.F.B.T.C. No. 8, Fresno, California.

Brown, Brian E., M.E., I., has been promoted from flight sergeant to a pilot officer of the Canadian Air Corps.

Chester, Louis, A.S. I., recently finished his basic training at Keesler Field, Mississippi, and was transferred to Lowry Field, Colorado, where he was assigned to photo-topography. He is a private in the United States Army Air Corps and may be reached as follows: 25TSS, U. S. Army Air Corps, Lowry Field, Colorado.

Moore, Warren F., M.E. I., writes that on March 11 he entered and received his first pair of wings and is quite proud of them. His younger brother is a lieutenant (bombardier) in the Army Air Corps and another brother will begin the V.O.T. training. Mail may be sent to Cadet Moore at Parson Hall, Box 41, Terre Haute, Indiana.

Pressly, Edward S., A. I., is an aviation cadet in the United States Army Air Corps. His army address is: A/C Pressly E. S. 43-J C.D., T.A.F.S., Tuskegee, Alabama.

Schaffer, John W., M.E. I., is a private in the U. S. Army Air Corps and may be reached as follows: 805th T.G., A.A.F.T.T.C., B.T.C. No. 8, Bks. 186, Fresno, California.

Twomey, John E., M.E. I., recently wrote the following letter to the Alumni Office.

This is just a short note from a very hurried Army Air Corps private. My name is John E. Twomey, vice-president of the class of 1945. I am in the Air Forces meteorology program B—at the University of Wisconsin. My address is: Pvt. John E. Twomey, 16147821, Sec. 8, T.D. No. 2, A.A.F.T.T.C., University of Wisconsin, Madison, Wisconsin. Our course of studies is plenty rugged. However, with the background Illinois Tech has given me (and several other Armour men here) I'm sure everything will turn out satisfactorily.

Yours sincerely,
(signed) John E. Twomey.

Sommers, Warren, M.E. I., an ensign in the United States Naval Reserve, received his wings last December and is now awaiting orders for active duty.

1945

Christian, Richard S., Ch.E. I., is a private in the United States Air Corps and is stationed at T.D. No. 2 A.A.F.T.T.C. Swenson Hall, University of Wisconsin, Madison, Wisconsin.

Horwitz, Arthur W., M.E., I., a private in the United States Army Air Corps writes that his present address is: 805 T.G., B.T.C. No. 8, Bks. 183, Flight 73A, Fresno, California.

Loomis, Russell F., Jr., M.E. I., writes that he is at Basic Training Center No. 8, located in Fresno, California. He does not know how long he will be there and where he will be stationed later but in the meantime would like to hear about things happening back at school. Mail will reach him addressed to Prvt. Russell F. Loomis, Jr., 805th Training Group, B.T.C. No. 8, Bk. 185, Flt. 73, Fresno, California.

Sominsky, Eugene G., A.S. I., recently wrote the Alumni Office the letter which follows.

I received your letter sent to all members of the enlisted reserve. Thank you. I really appreciated the fine gesture.

Please place my name on the membership roll of the Alumni Association of Illinois Institute of Technology. Receiving publications and other privileges of this wonderful group will make my stay in the Armed Forces so very much more pleasant.

Sincerely,
(signed) A/C. Eugene G. Sominsky,
A.S.N. 16,079,900
Barracks 889, 306 Training Group
A.A.F. Basic Training Center (No. 3)
Sheppard Field, Texas.

1946

Cattanach, Alex, M.E. I., a private in the United States Army Air Corps may be reached as follows: 406th Training Group, Flight W, A.A.F.T.T.C., B.T.C. No. 4, Miami Beach, Florida.

Gerleman, Kenneth F., Ch.E. I., is stationed at the Army Air Forces Technical School, Sheppard Field, Texas. Mail will reach him if addressed to Prvt. Kenneth F. Gerleman, 302 T.G., Flight 18-A, Sheppard Field, Texas, A.S.N. 16139079.

Goeppinger, Harry J., M.E. I., a private in the United States Army Air Corps, may be reached as follows: 302nd T.G., A.S.N. 16,138,178, Barracks No. 867, Sheppard Field, Texas.

Hootman, William K., A.S. I., is stationed at Fresno, California according to a letter received from his mother, Mrs. Charles Hootman. The letter reads as follows:

I received the letter addressed to my son William Kingley Hootman, one of your students who was called into service February 22, 1943. I am writing to him today and will forward your letter to him. I am sure that he will be pleased to learn that his name is on the membership roll of the alumni association and also on the Institute's Honor Roll.

His address is: Prvt. William Kingsley Hootman, B.T.C. No. 8, 799 T.S.S., Bks. 177, Fresno, California.

Sincerely yours,
(signed) Mrs. Charles Hootman.

Kaplan, Jerry A., E.E. I., writes that there is a "swell" group of college men with his squadron from the Six Corps Area and that they all enjoy their work. He states that he intends to finish his studying at I.I.T. after the war is won. Mail will reach him if addressed to Private Jerry A. Kaplan, A/C, Army Air Force, Barracks 20A, 302 T.G., Sheppard Field, Texas.

Lenke, George H. Jr., M.E. I., is a private in the United States Army Air Corps. He may be reached as follows: Barracks 226, 306th Training Group, A.A.F.B.T.C. No. 3, Sheppard Field, Texas.

Neurauter, James H., E.E. I., writes that he is a private in the United States Army Air Corps stationed at Sheppard Field, Texas. His mailing address is: A.S.N. 16,139,015, Barracks 888, 306th T.S. Squadron, Army Air Force, B.T.C., Sheppard Field, Texas.

Parker, Donald W., Ch.E. I., recently wrote the Alumni Office as follows:

I was greatly honored to learn that I may become a member of the Alumni Association and have my name placed upon the Institute's Honor Roll. I would be extremely indebted to you if you would place my name where I would be the proudest to see it.

The Army Air Corps keeps us quite busy.

Thank you for you best wishes and the same to all your endeavors.

I speak in behalf of all of us who left Illinois Institute of Technology when I say, "God bless you and the Institute for its unequaled contribution to the furtherance of this scientific world."

Sincerely yours.
(signed) Prvt. Donald W. Parker,
302 T.G. Flight 18A
Sheppard Field, Texas.

Snyder, Richard, C.E. I., is a private in the United States Army Air Corps.

ENGAGEMENTS

1940

Mr. and Mrs. M. H. Hunt of Regent Street, Schenectady, New York, have announced the engagement of their daughter, Miss Justine I. Hunt to Jack A. Clark, M.E. A., son of Mrs. V. R. Clark of Chicago and T. A. Clark of New York. Mr. Clark is an engineer with the Industrial Control Department of the General Electric Company.

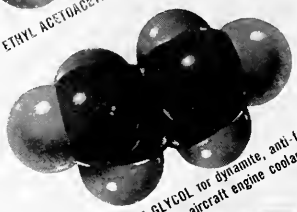
1942

Mr. and Mrs. Harold Lindholm, 1121 Prospect Avenue, Iron Mountain, Michigan, have announced the engagement of their daughter, Miss Betty Ann, to Leon W. Byrls, A. I., son of Mr. and Mrs. Byrls, 2428 North Maplewood Avenue, Chicago, Illinois. Miss Lindholm is a senior in the nursing school of Augustana

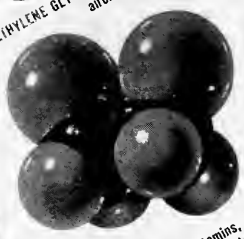
ACETONE for rayon, photo film, solvent

BUTADIENE for synthetic rubber

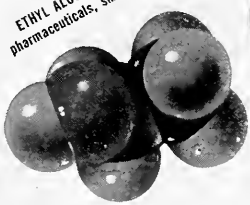
ETHYL ACETOACETATE for life-saving drugs, vitamins



ETHYLENE GLYCOL for dynamite, anti-freeze, aircraft engine coolant



ETHYLENE DICHLORIDE for vitamins, anti-knock fluid, plastics, insecticides



ETHYL ALCOHOL for lacquers, pharmaceuticals, smokeless powder

Molecular Keys To A New World

VAST NEW SOURCES of raw materials . . . the equivalent of those which might be found in a great new continent . . . opened to America when CARBIDE AND CARBON CHEMICALS CORPORATION, a Unit of UCC, started building synthetic chemicals from water, salt, air, and hydrocarbons.

These chemicals are usually water-white liquids, although some are gases or solids. Basically, they are compounds of carbon and hydrogen—united with oxygen or with chlorine to build up an endless series of chemicals. The models of those molecules of chemicals shown here are many millions of times actual size.

These chemicals are the raw materials for fabulous plastics . . . amazing textile fibers . . . life-saving drugs . . . vitamins by the carload . . . synthetic rubber . . . more things and better things than were possible before their existence.

Since these chemical wonders are obtained from abundant domestic sources, their use has contributed materially to the nation's self-sufficiency. Through research, American ingenuity, and patient development, scarce natural products have been duplicated or improved upon. Great new industries and great new materials that contribute to the nation's strength have come into being. And America has become a leader in a field as native as its own soil.

Broadly speaking, the uses of many of the synthetic organic chemicals developed by CARBIDE AND CARBON CHEMICALS CORPORATION are just beginning. The already established uses are indicative of their vast future values to mankind.

BUY UNITED STATES WAR BONDS AND STAMPS

BETTER MEDICINES! Amazing medicines like the sulfa drugs, synthetic vitamins, powerful insect repellents, and anti-malarial drugs depend upon synthetic organic chemistry.

COLD PROOF! Coolant for liquid-cooled aircraft engines and base for anti-freeze in military cars and trucks is ethylene glycol, an important synthetic chemical.

MAGIC PLASTICS! Wonderful plastics that look like glass, stretch like rubber, and which are proof against water, sunlight, oils, and many chemicals are made from VINYLITE synthetic resins.

MAN-MADE! All types of synthetic rubber require synthetic organic chemicals for their manufacture. Here's hope for tires for you in the future.

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York, N. Y.

Principal Products and Units in the United States

ALLOYS AND METALS
Electro Metallurgical Company
Haynes Stellite Company
United States Vanadium Corporation

CHEMICALS
Carbide and Carbon Chemicals Corporation

ELECTRODES, CARBONS AND BATTERIES
National Carbon Company, Inc.

INDUSTRIAL GASES AND CARBIDE
The Linde Air Products Company
The Oxweld Railroad Service Company
The Prest-O-Lite Company, Inc.

PLASTICS
Bakelite Corporation
Plastics Division of Carbide and Carbon Chemicals Corporation

Hospital, Chicago, and will be graduated May 11. Her fiancé is employed in the engineering department of the Goodyear Aircraft Corporation, Akron, Ohio. Wedding bells are tentatively set to ring in December of this year.

The engagement of CARL H. SPARENBERG, F.P.E. L., to Mary Louise Barkley was announced by her parents Mr. and Mrs. Guy Carlton Barkley of 6300 Northwood Avenue, St. Louis, Missouri. Mr. Sparenberg is stationed at Coral Gables, Florida and expected to receive his commission in February. Wedding plans are indefinite.

Mr. and Mrs. Morris J. Frankel of N. Whipple Street, announce the engagement of their daughter, Rochelle, to Ensign WARREN EDWARD SPITZ, A. L., son of Mr. and Mrs. Alexander H. Spitz of S. Bennett Avenue, Chicago, Illinois.

MARRIAGES

1914

SCHOEMBS, ARTHUR F., E.E. A., was married to Miss Helen Elizabeth Sullivan of Memphis, Tennessee, on February 8, 1943, at Sacred Heart Catholic Church in Memphis. The Reverend Francis Pack officiated. Mr. Schoembs has been connected with Hotel Peabody, Memphis, for several years.

1938

The marriage of Dorothy Robbins, daughter of Mrs. George H. Robbins of Madison, Wisconsin, to WILLIAM ROBERT MARSHALL, JR., Ch.E. A., son of Mr. and Mrs. William Robert Marshall of Chicago, took place in the Westminster Presbyterian Church of Wilmington, Delaware. Mr. Marshall is employed in Wilmington, where they will live.

1943

Wee Kirk 'o the Heather Church in Glendale, California was the scene of the recent marriage of LT. JOHN E. MURRIN, JR., M.E. L., to Helen Tellyer Roberts of Hanford, California. Lt. Murrin is a flight instructor at the Lemoore Army Flying School. The young couple are now at home in Hanford after a wedding trip to Lake Arrowhead.

BIRTHS

1936

Robert Adkins Samuels was born on February 23, 1943, to Mr. and Mrs. Robert P. Samuels. Mr. Samuels is a graduate in architecture.

1939

A very clever and unique birth announcement was received by the Alumni Office from Mr. IRVING M. FOOTLIK, M.E. A., regarding the birth of a daughter on March 3, 1943. The announcement was a blue print of their apartment at 3245 Franklin Boulevard and on the right side of the plan of the apartment it reads as follows:

The Footlik Construction Company
Chicago, Illinois
Announcing the 1943 Footlik
BABY GIRL
Model No. 1 Released 3-7-43
Name Janice Bernice
Irving Footlik, Designer & Chief Engineer
Sylvia Footlik, Production Manager.
Dr. John E. Evans, Technical Assistant
Featuring
Two Lung Power—Free Squealing—Streamline Body—Economical—Water Cooled Exhaust—Changeable Seat Covers—Curves Galore

Footlik Construction Company
From original started 7-21-42
Drawn by I. M. Footlik
Checked by Sylvia Footlik plan No. 1.
Scale 1'—3" Drawn 3-7-43
Scene of Action Franklin Boulevard Hospital
3240 West Franklin Boulevard

OBITUARIES

1914

FINLEY, MISS GEORGIA E., H.E. L., died on February 7, 1943 at an Indianapolis Hospital, Indianapolis, Indiana. Miss Finley taught Home Economics at the Indiana University for twenty-five years. She was a native of Oneida, Illinois, and attended Knox College at Galesburg, Illinois.

STUDENT WAR COUNCIL

By
HARRY R. GILLESPIE, JR.

Early in 1942, February 4 to be exact, the I.T.S.A. formed a committee to be known as the Student War Council. The students elected to this council were chosen on the basis of their interest in the school and their proven leadership. The council is not purely a Civilian Defense project. In fact, only in a few instances has it participated in what might be called civilian defense activities. The Student War Council has primarily interested itself in two principal objectives: (1) the protection of the students at I.I.T. from any mishaps on the campus that might result as a part of this war, and (2) the sponsoring of projects and drives that directly help the war effort, such as blood donations, Red Cross drives, scrap drives, etc.

The first activity of the S.W.C. was to have John F. Langdon, then representative of Youth Activities in the Chicago area speak at the Armour and Lewis Campuses on civilian defense of Chicago and the need for a committee such as the S.W.C. at every college.

The council then undertook to organize the students to donate to the Red Cross blood bank. The students organized in groups of about twenty, and each week, for nearly a semester, a group went down to Red Cross headquarters in Chicago and donated blood for our brothers in the armed services.

Later that year, during the summer, the S.W.C. obtained the Red Cross mobile unit at the south campus, and, although during the summer only seniors and cooperative students were in class, over one hundred pints of blood were collected.

During the following fall semester the Red Cross agreed to return—this time for three days. As a result, over 600 pints of blood were drawn from the Techawks. The doctor in charge of the mobile unit commented at that time on the unusually good health of the students. An estimated 850 pints of blood have been donated to the Red Cross by the students at I.I.T. Plans are under way at present to bring the mobile unit back to the Institute this summer.

The student body has cooperated with the S.W.C. who, in conjunction with the Faculty Woman's Club, have put on a Red Cross Fund drive. The students alone have contributed about $200, including change received at the lunch counter and bookstores. The faculty and secretaries at school also have contributed a sum of money, all of which will be combined in one donation to the Red Cross from Illinois Institute of Technology.

At the beginning of the S.W.C. activities in early 1942, many small but important projects were undertaken. At a meeting of the council with the treasurer and maintenance supervisor of the school, arrangements were made for the installation of an air-raid siren. Within the week a new steam whistle was installed.

The members of the council, in conjunction with the maintenance supervisor, placed air-raid directions in every lab and class room in the Institute. Another result of this meeting was the installation of paper-towel saving devices in all the washrooms of the Institute.

A scrap drive was supervised by the council in the fall of the year and resulted in the scrapping of the big metal fence surrounding Ogden field. Many other small scrap piles were built up to supplement the many pounds from the iron fence.

A First Aid Corps was formed and students with standard or advanced Red Cross certificates in first aid were instructors. A large, new, fully equipped field first-aid kit has been purchased by the school. This kit contains everything from surgical instruments and bandages to two large stretchers.

The Rifle Club has undertaken the task of teaching the fundamentals of the rifle to students in the enlisted reserve. They have organized lectures and demonstrations on the nomenclature and use of firearms. This has resulted in an advanced knowledge for those men who are already in the service.

Late in the fall semester a plea for

(Turn to page 53)

Something for you to do, afterward?

A MESSAGE TO MEN ON COLLEGE CAMPUSES

At no time in all the years we have been the confidant of young men approaching a career have we been so sure of the opportunity implicit in your future.

Today, your campus may not be of your own choosing. Your courses, your schedules almost all are pointed toward immediate necessity. Your career is set.

Have you a true conception of how much your special training means to your country? To Victory?

We think you do. But, honestly, don't you catch yourself wondering whether there is really going to be something for you to do, afterward? Are you sometimes in doubt of what's to come after NOW?

We say to you: There is a world to be made anew.

That world is going to offer you creative opportunity surpassing anything we old-timers have ever seen. You are going to have tools and materials and knowledge to work with such as no generation ever had.

We think you are going to find not only a country, but a whole world, waiting for your talents.

And we know that in this country you are going to find a point-of-view throughout industry which is a new thing under the sun. Already countless leaders in industry are laying plans which are based on flat acceptance of the principle that their first responsibility, after all-out production for war, is to make postwar jobs.

We at Alcoa are one group of such men. We are Imagineering now, for you. We intend to do everything we know how to make aluminum make jobs, whether they may be with us, or in a thousand other industries which will be using Alcoa Aluminum when it is again available.

Wherever you are in service, you will surely be in, or around, or supported by, American airplanes. Will you remember two things: They are made largely of Alcoa Aluminum. *And*, the folks who make that metal are even now Imagineering for your future.

A PARENTHETICAL ASIDE: FROM THE AUTOBIOGRAPHY OF

ALCOA ALUMINUM

• This message is printed by Aluminum Company of America to help people to understand *what we do* and *what sort of men* make aluminum grow in usefulness.

PAMPA

(From page 10)

to step right up and buy the tickets with no more delay than that enjoyed by the less favored multitude."

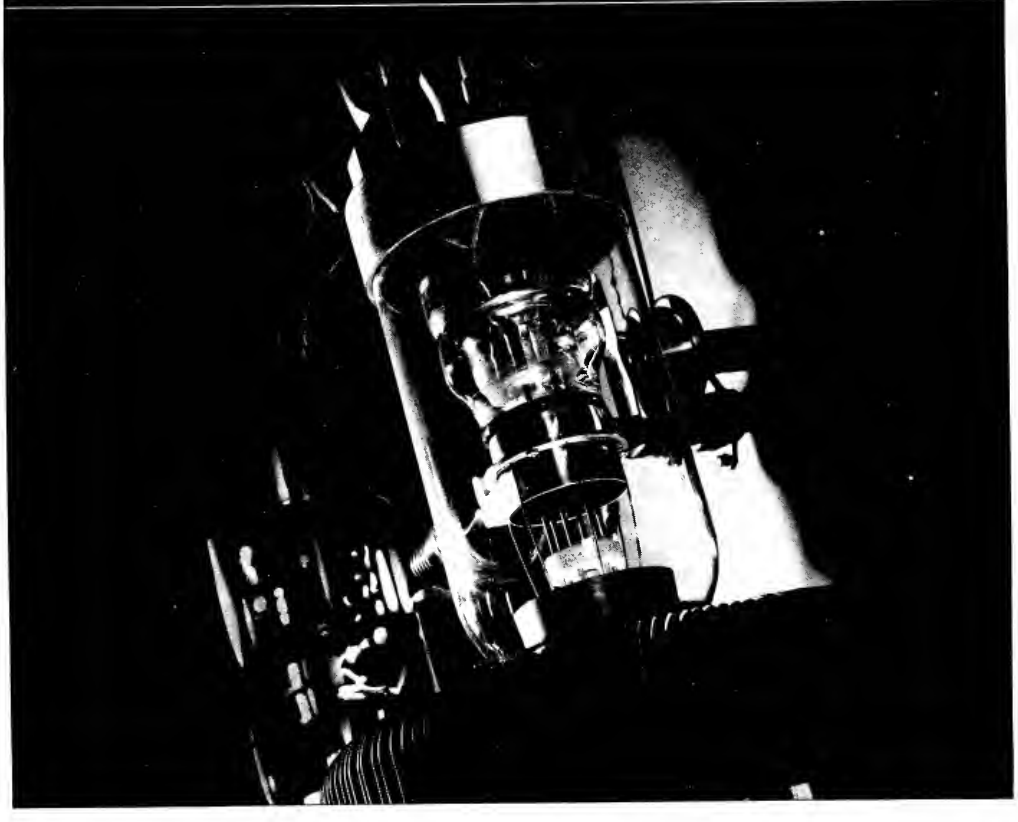
Skipping over the details of that day's work and coming to the entry for the following day, the log reads: "Up early to catch the boat for Posadas, as this is the only boat for several days. We dressed, packed, breakfasted, paid the hotel bill, and were on the dock at the appointed hour of eight. The boat—a small Diesel sidewheeler—was there, but was starting to unload a cargo of yerba maté. This operation continued until eleven while the passengers stood on the dock inhaling cinders from a small but vicious tug tied alongside."

Eventually we boarded and started up the river. Shortly after getting under way we paid our respects to the captain and inquired about the probable time of arrival at Posadas. We were assured that we would reach Posadas at the scheduled time of six o'clock the following evening. This struck us as curious, since we started three hours late and had to fight a stiff river current all the way. The captain confided that as a matter of fact the boat always started at eleven, but that passengers were always told that it would leave at eight. This, he explained, was to teach them to be punctual. We have not figured this one out yet, but the motives are admirable.

Both banks of the wide Alto Paraná are thick jungle, with a profuse mixture of hardwoods, bamboo, and palms interlaced with large vines and underbrush. Large patches of tall rushes are found along the river banks. Alligators of a special variety are said to infest the waters, although we saw none from the boat. Here and there a lone white crane or some other water bird stood pensively, while dive-bombing squadrons of parrots objected loudly to whatever was going on. The boat followed a tortuous channel, sometimes in midstream and sometimes almost under the overhanging trees whose enormous white blossoms outlined the shore. There was seldom any evidence of human habitations, but now and then a small clearing showed a few grazing animals.

While the little sidewheeler plodded up the river we gathered about a table in the diminutive lounge. Surrounding ourselves with notes, papers, maps, and portable typewriter we continued our task of arranging detailed itineraries and schedules, keeping the color cameras handy for an occasional interesting shot of passing scenery. Not until next morning did we discover how dangerous this innocent afternoon had been. The log for July 25th reads: "Another day similar to yesterday, with more luxuriant jungle, etc. Our guide told us that he had played cards in the lounge last evening with two travelling salesmen from Buenos Aires, and discovered that the other passengers had been contemplating action against us as Nazi spies. It seems that the Nazis had for months been travelling on the river boats taking pictures of the shore, sticking colored pins in maps, making notes, measurements and calculations. The Argentines were beginning to resent it, and on a previous run had tossed a group of agents overboard, equipment and all. Our turn was to have come yesterday, but by good fortune one of the passengers had decided that the language we were speaking was English instead of German." Probably this happy circumstance prevented us from learning at first-hand just how many alligators really did infest the river.

This is Fred Allen's horse...



EVER wonder how Fred Allen manages to ride into millions of homes every week and emerge life-size and full-voiced from radio loud speakers?

The "horse" he rides is a big radio transmission tube like the one shown above. One reason it carries him smoothly and without interruption is that Corning research has perfected a glass for radio tubes that will stand heat and voltage of modern transmission.

Corning furnishes glass for the tubes in your own radio set, too. Just as it furnishes glass for many of your lamp bulbs; for the Pyrex cooking utensils in the kitchen back home. But to many, and particularly to the man who is making engineering his life work, Corning research is most interesting because of the things it has discovered that glass can do in competition with other materials, and do better. Glass springs, for instance, that apparently never tire out. Glass acid pumps that replace valuable metal alloys and give longer service in the bargain! Glass piping, and valves, nuts and bolts that resist chemical attack. Every day Corning is working on ways in which glass, still fairly plentiful, can be used to replace metals that are vital to war industry.

Glass is important today. And as more is discovered about this remarkable material, no one can predict the boundaries of its usefulness. For instance, glass precision gauges (ring, plug and others) are now being produced that are in many ways superior to ones made of steel.

As you get further into engineering, keep an eye on glass. The greatest things in glass are yet to come. Corning Glass Works, Corning, N. Y.

CORNING
means
Research in Glass

The jungle journey was followed by our usual sojourn in Buenos Aires for the purpose of consolidating notes and data between trips and making last-minute preparations for study of the next zone. From this point on we found it possible to take an automobile wherever we went, although at times the automobile was carried over stretches in a freight car. Before going north into the desert region an extra gasoline tank was installed, and this proved useful again in Patagonia.

Roads in the northwest were not bad, but unbelievably dusty. They were not infrequently paved in the western Andean region near Mendoza. Sometimes, as between San Juan and Jachal, the entire countryside was perfectly flat except for the road which was corduroy. Along the southern Andes the roads were hilly, but reasonably smooth, and here the chief obstacle was water in unexpected places.

Melting snows from the mountains in western Neuquén, Río Negro and Chubut create countless rushing streams and rivers of ice-water. Motorists cross these in various ways, but seldom by bridges. The most common method is to drive through them, frequently with several inches of water above the floorboards. Sometimes the motor stops in midstream, but you can't expect to win all of the time. Deeper rivers are crossed with the aid of horses after wrapping the engine in canvas. If there is any real danger of drowning, a small cable ferry is usually provided. Our expedition had rather good luck in this region, only once finding it necessary to pull the car out of the river by handheld ropes.

The principal report of Armour Research Foundation Project 1-143 occupies 450 pages, but this does not include the hundreds of little incidents that sparkle through the day-by-day log. The report says nothing about the many new friends made, the spirit, hopes and thoughts of the Argentine people, their music, their superb food (including abundant beefsteak and native wines), and all the highlights on the human side that make such a survey anything but dull. Above all, we know that this work has given us a deeper understanding of our southernmost American neighbors, and we can hope that our friendly sentiments are shared by them.

STOKERS

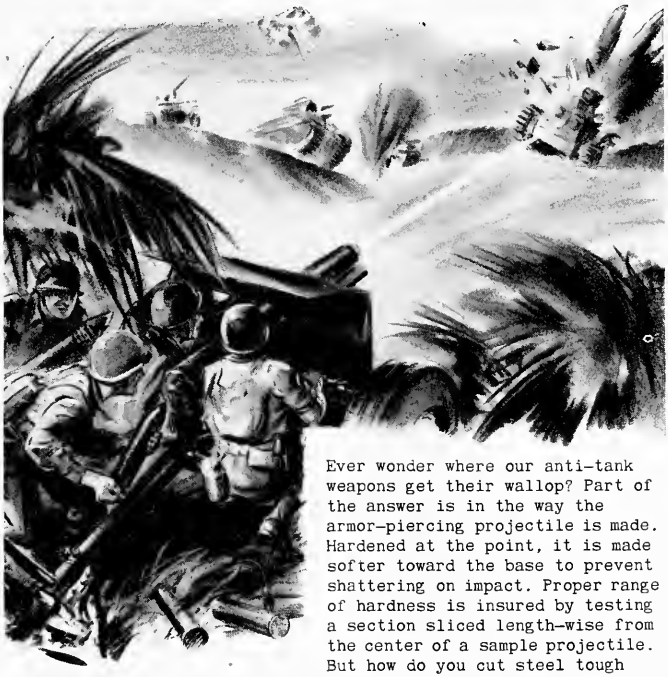
(From page 12)

mechanisms, or gadgets on these machines. Installation, maintenance, and repair costs are low.

It should not be concluded, because the stoker is now mechanically simple, is adaptable to many coals and heating plants, is easy to operate, and gives advantages of convenience and comfort to the owner, that this was always so. As with most simple machines there are hidden in it the lessons of many years of development, the knowledge of many metallurgical and combustion engineers, and the ingenuity of the designing personnel. The pitch of the feed screw, the shape of fan housing, the number and placing of the tuyere ports in the retort, the design of the air control, and many other items are the results of engineering perseverance and intelligence.

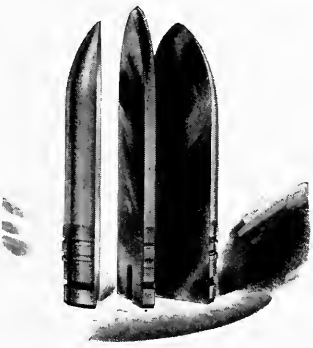
In the early years, development was largely by trial and error, main strength and stubbornness. In recent years greater financial returns to manufacturers have provided funds for well equipped laboratories, technical personnel, and extensive devel-

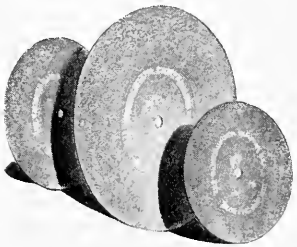
Set 'em up in the other alley!



Ever wonder where our anti-tank weapons get their wallop? Part of the answer is in the way the armor-piercing projectile is made. Hardened at the point, it is made softer toward the base to prevent shattering on impact. Proper range of hardness is insured by testing a section sliced length-wise from the center of a sample projectile. But how do you cut steel tough enough to pierce a tank? With a cutting off wheel such as made by Carborundum!

Cutting off wheels are abrasive discs that are amazingly tough and often extremely thin. They do the work in a fraction of the time required by ordinary methods. Their high precision adapts them to the most delicate operations such as slotting pen points. Such wheels are now used to cut plastics, glass, brick, tile, steel and non-ferrous metals in plate and bar stock. Frequently further finishing is unnecessary.





When you take your place in the war industries, keep Carborundum in mind. We will always be ready to help you with problems where the use of abrasive products is involved. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

opment programs. A number of colleges, universities, and other organizations have also taken up the work, and all of our technical knowledge of coals, combustion, heating plants, and materials has been brought to bear on better designs and better application.

To illustrate some of the items involved and the procedure used in present day investigations, a little will be told of the Stoker Coal Research Laboratory of the Koppers Company.[4] The project has as its objectives the study of the behavior in stokers of coals from the company's various mines, the determination of the proper sizing, de-dusting, etc., of these coals, and the investigation of the effect of various stoker adjustments upon operation.

The following are standard items recorded in routine investigations: The coal is sampled and tested for its sizing (screen test); proximate and ultimate analyses are made; specific weight, British swelling test number, and dustiness index are determined; and in most cases ignition temperature and fluidity (by the Gieseler apparatus) are investigated.

Data taken at regular intervals during a test include readings of the barometer, relative humidity, room temperature, water temperature, coal used, revolutions of feed worm, running time, total power, air delivered by stoker fan, water evaporated, stack draft, and flue gas analysis (CO_2, CO, O_2).

Data recorded continuously by suitable instruments include power demand, boiler output, furnace draft over fire, stoker wind box pressure, flue gas temperature, stoker retort temperature, CO_2 record, smoke, and photographic record.

At the end of each test the clinkers and loose ash remaining in the fire box are weighed and the percent ash determined. The weight of coke remaining is recorded, and tests are made for screen analysis and specific gravity. The fly ash is taken from the boiler passes and weighed and determination is made of cubic foot weight, screen test, volatile matter, and percentage ash.

From the analysis and comparison of all these data, conclusions can be drawn as to the effect of adjustment, manner of installation, and type of heating plant, upon: efficiency, fly ash, smoke, clinkering, response to demand, fuel bed resistance, burning rate, and power per ton of coal. Among the most valuable records were the time-lapse movies taken. They provide: first, permanent visual records for laboratory analysis and, second, a powerful illustration to others

We're growing friends in our Victory Garden!

"YES, we're having plenty of company these days—digging out there in the back yard.

"Neighbors, passersby, folks to whom we've seldom said more than 'How do you do!' often stop and admire our rows of sprouting vegetables. Usually that's a good excuse to knock off work for a few minutes—whereupon I suggest: 'You know, something tall and cold would taste mighty good right now. Won't you folks join us in a glass of beer?'

"Well, when those frosty bottles of Pabst Blue Ribbon come out on the tray, we all sort of let down and relax. It's mighty pleasant." All over America, people are rediscovering the simple pleasures of life. Home...back porch...neighbors. And more than ever, Pabst Blue Ribbon Beer has become a symbol of friendly companionship.

That softer, kindlier taste is obtained by a Pabst process of FULL-FLAVOR BLENDING. Pabst actually combines no less than 33 master brews into one magnificent beer. There is no finer beer in all the world than Pabst Blue Ribbon.

TUNE IN THE LAUGH SHOW OF THE WEEK. GROUCHO MARX as your host of "BLUE RIBBON TOWN" Every Saturday Night...Coast-to-Coast CBS NETWORK

of results obtained. The taking of time-lapse movies involves exposing the film frames at regular intervals but with a greater time between frames than the standard camera allows. For example, by means of a special timing and operating device, most of the pictures are taken at the rate of one frame per minute. The projector then shows these at 16 frames per second, with the result that action is speeded up 960 times. The rise and fall of the fuel bed becomes readily distinguishable and a whole week of operation may be seen in a few minutes. The clarity with which changes in operation are thus illustrated could be obtained in no other way.

The vital part that coal stokers play in our national economy is shown by the approval of the War Production Board for the continued manufacture and sale of stokers having a coal feed rate of 75 lb. per hour and over. Restriction to the larger size is based upon the greater savings these sizes can make per pound of metal and per electric motor and per set of electrical controls.

The savings recognized are: In coal, because of more efficient burning, in labor, both at the boiler plant and at the coal mine (since less coal has to be produced); in transportation of coal, since less is used and because in many cases stokers will burn local coals which are not adaptable to hand firing; in new boilers, because rates of old boilers can be stepped up; and in oil, where stokers are used to convert from oil to coal.

In looking toward the future, it is obvious from the amount of research and development work taking place that there will be continued improvements in underfeed stokers, in coal preparation, and in application of stokers and coals. Judging from the upward surge of sales previous to our entrance in the war, and from the general public acceptance, it seems certain there will be a further increase in yearly sales after the war with annual installations due to go well over a quarter of a million units.

References

1. Stoker Manufacturers' Association Reports.
2. *Stoker Coal Consumption*, K. C. Richmond, Coal Heat, p. 44, Jan. 1943.
3. *Performance of a Stoker-Fired Warm-Air Furnace as affected by Burning Rate and Feed Rate*, A. P. Kratz and S. Konzo, Heating, Piping, and Air Conditioning, Jan. 1940.
4. *Research on Coal for Domestic Stokers*, Walter Knox and J. D. Doherty, A. I. M. E. Technical Publication No. 1148.

PHYSICAL TRAINING

(From page 19)

all soldiers and sailors — are also taught.

To visit gymnasium classes at Lewis Institute is to become aware that Physical Education has gone to war. Aggressive, disciplined, quick thinking, courageous, and enduring young Americans are being turned out without the fanfare typical of American athletics. Some individuals can do best before a grandstand cheering section, but the real test of a man is to fight on and on with no one to cheer him on except his own desire to serve Our Cause. To conquer others we must first be masters of ourselves. Physical educators the nation over have dedicated themselves to the task of training such men.

Most of our Techmen are aware that they will need to be in the best physical condition when they enter the fighting forces, and their fine attitude is reflected in their work. While they know that ability to react rapidly and effectively is important, they are also becoming cognizant of the fact that physical education does not mean sacrifice. The opposite is true. The athlete is expected to give up only

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those things that destroy his health, intellect, and moral character, and, in their stead to practice things that develop them. The athlete and soldier alike know that to win, one must achieve his goal and never quit in midfield. Evidence surrounds us that, in times of stress, character is born and that our so-called soft and pleasure-loving youth of yesterday are, today, a credit and an inspiration to all America.

ABOUT THE AUTHOR

Arthur E. Wright is executive secretary of the Alumni Association of Illinois Institute of Technology.

On account of the war many of the faculty members at Illinois Tech have had to take on duties in addition to those of their peace-time positions. Wright's background in physical education, made it possible for him to organize and administer the physical education program for men at the Lewis Institute Division of Illinois Tech when the war made such a program imperative.

He spent three years at George Williams College, where he majored in physical education; received his Bachelor of Physical Education degree from the American College of Physical Education; and received his Bachelor of Science degree from Illinois Tech.

As an officer in the United States Department of Justice he attended, and was graduated from, that department's training school at which, among other things, he became proficient in the art of Jiu Jitsu.

His experience as a physical educator includes administration of summer-camp aquatics and sports; recreational leadership at the University of Chicago Laboratory Schools; Assistant Director of Blackhawk Boys' Clubs; Y.M.C.A. Aquatic Director; and Y.M.C.A. Physical Director.

He was awarded diploma and title as Certified Aquatic Director by the National Council of the Young Men's Christian Associations.

He is a member of the American Association for Health, Physical Education, and Recreation.

PROGRESS REPORT

(From page 21)

mands are trained in fire prevention at Massachusetts Institute of Technology and in accident prevention at New York University. The constant cooperation of the Washington authorities of the Internal Security Division, Colonel Johnson, Colonel Carl Richmond of the Fire Prevention Branch, and Major Edward Granniss of the Accident Prevention Branch, is gratefully acknowledged. Graduates of the Institute's Fire Protection Engineering Department who have taken the course include Robert H. Lange, '41; Otto S. Peterson, '26; Charles M. Schneider, '27; Jarl T. Sorensen, '33; Harold A. Swinson, '27; and David C. Timberlake, '36.

The third of the full-time Safety Training courses is a two-weeks, intensive course, devoted mainly to accident prevention but with a brief treatment of fire prevention. It is designed to train supervisors from the posts and stations in the Sixth Serv-

ice Command. This course is being offered in each of the Service Commands, and the Institute was asked by Service Command, to organize the General Guthner, Chief of the Internal Security Division of the Sixth course for civilian personnel. Selection and assignment of class members is under the jurisdiction of Mr. E. M. Jasper, Training and Safety Branch, Civilian Personnel Division, Sixth Service Command. Major Ralph Applegate, Chief of the Accident Prevention Branch, Internal Security Division, Sixth Service Command exercises general supervision over the course, since all accident prevention activities in the Sixth Service Command fall within his assignment.

Three sections of this most recent course, Safety Engineering for the Services of Supply, have now been completed, and it is contemplated that this course will continue to be given each month for the duration. This course, and Plant Protection Engineering, are given in classrooms adjoining room 1425, Civic Opera Building. The lobby between the classrooms is now the scene of an excellent exhibition of safety apparel, goggles, fire extinguishers, etc. The War Training Committee is grateful to Mr. Fred Guilbert, of the Chicago Eye

Shield Company for arranging this exhibition.

One of the outstanding results of the Safety Training Program at the Institute has been the improvement in conditions in our own shops. The machine shop at Lewis is rapidly being made into a model shop, with guards and other appropriate safety devices installed on the machines. A general clean-up campaign has also been instituted and gradually we are beginning to practice what we preach.

The War Training Committee feels that the work in safety training is one of the most valuable phases of the entire Engineering, Science, and Management War Training Program. A man who has once been exposed to safety is thereafter safety-minded continually, since safety is like swimming; once learned, it cannot be forgotten. The assistance of the many individuals and organizations who have participated in these programs is gratefully acknowledged. All safety is a cooperative venture, and these safety courses have been successful because of the excellent cooperation extended by everyone whose assistance has been sought.

MOUSE TRAPS

(From page 28)

necessary to avoid contact resistance troubles which could be expected if the switches were employed in series with the bridge arms. One convenient method of balancing the bridge is to mount a strain gage on a cantilever beam which can be deflected by a micrometer screw adjustment. This system is smoother in action than slide wire resistances.

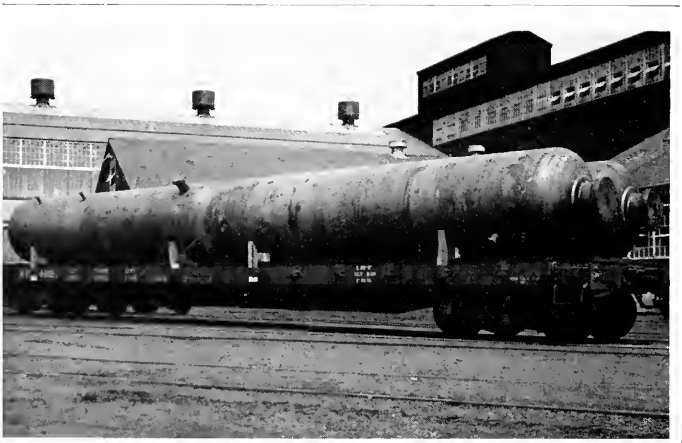
The best circuit for slow-speed dynamic strain measurement is the amplitude-modulation circuit. The general principle of this circuit is to place the strain gage as one arm of a balanced AC bridge; then, any change in strain in the member to which the gage is attached will cause an unbalanced voltage to appear across the bridge. This difference may be magnified by an amplifier designed to have its peak response at the carrier frequency. The amplified signal may be applied to a cathode-ray oscilloscope or to a rectifier-type meter. The rectifier-type meter can only show the value of static or very low-frequency dynamic strains, while the cathode-ray oscilloscope can follow rapid strain variations. In designing the amplitude-modulation system for use with the cathode ray oscilloscope there are two choices of pattern. The amplitude-modulated wave may be viewed or the signal may be detected or rectified and the carrier frequency removed by means of filters, leaving only the strain-versus-time curve. But the ordinary amplitude-modulation pattern is to be preferred for most work since errors may be introduced due to time constants of the detector circuits.

The amplitude-modulation system is satisfactory for slow and moderate-speed dynamic-strain studies in which the slope of the wave front of the strain-time curve is not steep. The maximum frequency satisfactory in this system is of the order of ten percent of the carrier frequency, but this limit is abitrary and depends on the general shape of the strain-versus-time curve.

For impact studies the amplitude modulation system is not satisfactory since the frequencies encountered in steep wave-fronts are in excess of the side-band limitation of about ten percent of the carrier frequency. The circuit used for the study of steep wave-fronts is potentiometric. Here the strain gage is arranged in series with a fixed resistance and a battery. The potential drop across the strain gage varies with the strain in the member. This circuit is capable of response to very high frequencies but has the serious limitation that it can not be calibrated by static loading, since the normal amplifiers do not have response to static conditions. If the so-called DC amplifiers are used, they will respond to static calibrations, but their tendency to drift with time makes them unsuited to work in the field. Ordinary public-address amplifiers are not satisfactory for use with strain gages because of poor frequency response and extremely bad phase shift in the low frequencies. For satisfactory work it is necessary to design special amplifiers with low and high-frequency compensation sufficient to give flat response from 20 cycles to 100 kilocycles. For certain work it is desirable to design the amplifiers for good response at two cycles, but these amplifiers usually have excessive phase shift in the range between two and twenty cycles.

The use of strain gages for obtaining design information is only one of their many practical uses. They provide a very valuable means for measuring torque and other quantities in special machines. These strain gages are serving the war effort by making it possible to measure the actual loads encountered in machines and structures. As a result smaller safety factors are being made possible, and material is being conserved by designing equipment for the maximum strength consistent with minimum weight.

William R. Mehaffey.



DRUMS FOR THE SYNTHETIC RUBBER PROGRAM—These four 5-ft. diam. by 20-ft. long pressure vessels were fabricated at the Birmingham plant of the Chicago Bridge & Iron Company. They are typical of the many pressure containers required in the construction of plants for the production of butadiene, one of the important materials required to make synthetic rubber.

SCHOOLMASTER

(From page 29)

mands respect. It has dignity. We grieve for our loved ones who are giving everything for our protection, and who may not return. We grieve for the victims of savage oppression,

which, thank God, will be kept from us by our young men who have gone forth singing. On our own part, can we, should we sing?

The Pollyanna type is not appealing to us. In a trivial, unthinking way, it is heartless. "Wishful thinking," as a locution has become trite; as a mental habit it was always a weakness, an evasion. But when things go wrong—when the world has gone terribly wrong—still we will sing, and our singing will not be from weakness and futility, from ignoring or forgetting our griefs, but from our strength and resolution, from a realization that our shortcomings may have merited punishment but that our valor and our sacrifices will assuredly bring victory.

What shall we sing? Many songs—penitent, joyful, sometimes roistering if we are young and filled with the zest of living. But one song above all, now while there is much to grieve us—even more when the worst of the darkness has passed.

Mine eyes have seen the glory of
the coming of the Lord.
He hath loosed the fateful lightning
of his terrible swift sword.
His word is marching on.

During the fighting, during the "trampling out the vintage where the grapes of wrath are stored," and most of all when this nightmare has passed, we Americans will whisper our griefs to the saddle-bow, but we will ride forth singing The Battle Hymn of the Republic.

WAR COUNCIL

(From Page 40)

help was received by Dean Peebles from a nearby grammar school, which was to undertake the registration of 12,000 persons in the immediate vicinity for War Ration Book Number 2. The dean gave the job into the hands of the Student War Council. The S.W.C. then solicited the student body to help the members of the council. Three days were spent in the registration and well over 12,000 persons were registered quickly and efficiently.

A National Collegiate War Council has been formed with local headquarters at Northwestern University. The Illinois Tech Student War Council was asked to cooperate in the forming of the organization, and has been in accord with the movement from the start, for a delegate was sent to Northwestern to assist in the organization plans. Because Illinois Tech Students are especially interested in the man-power situation, we have been given a place on the Man Power Committee of the National Collegiate War Council.

PLASTICS AND METAL WILL PLAY JOINT ROLE AFTER WAR

A one-man debate on the post-war potentialities of plastics as opposed to metals ended recently in a draw, with the conclusion that each would complement the other to everyone's benefit. This conclusion was reached by Dr. A. Allan Bates, manager of the Chemical and Metallurgical Department of the Westinghouse Research Laboratories in East Pittsburgh, Pa. He weighed the pros and cons of "Metallic versus Non-metallic Materials in Engineering" for the Cleveland section of the American Institute of Electrical Engineers.

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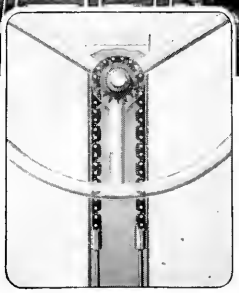

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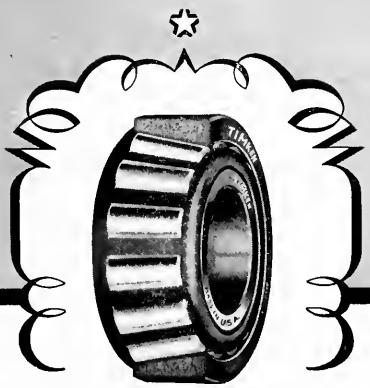

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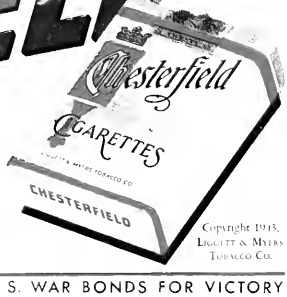

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